

Monitoring and Implementation Plan Clear Lake Mercury and Nutrient TMDL's

Introduction

The Clear Lake watershed is subject to two Total Maximum Daily Load (TMDL) requirements, one for mercury and one for nutrients. The TMDL's are required by the Clean Water Act (1972 as amended) and are implemented by the California Regional Water Quality Control Board, Central Valley Region (CVRWQCB) and the State Water Resources Control Board (SWRCB).

On December 6, 2002, the CVRWQCB adopted Resolution No. R5-2002-0207, Amending the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Mercury in Clear Lake (Mercury TMDL), see Appendix A. The goal of the Mercury TMDL is to lower mercury levels in Clear Lake so that the beneficial uses of fishing and wildlife habitat are attained. The Mercury TMDL requirements are described below.

- The beneficial use of the commercial and sport fishing (COMM) was added for Clear Lake. Clear Lake supports significant sport fishing and a small commercial fishery.
- Site-specific, numeric water quality objectives were adopted for Clear Lake. Methylmercury is the most toxic form of mercury and accumulates to the greatest extent in successive levels of the food chain. Nearly all methylmercury accumulated in humans and wildlife is through consumption of mercury contaminated fish and shellfish. Because of these factors, a numeric water quality fish tissue objective for methylmercury rather than the more common water column objective was adopted. The objectives of 0.09 and 0.19 mg/kg for fish in trophic levels 3 and 4, respectively, were adopted, which are numeric objectives based on protection of wildlife and human health. These objectives will protect the existing and the proposed beneficial uses and implementation of the actions described in the implementation program and should result in improvements in water quality conditions. Attainment of the objectives is expected to improve the economy of the Clear Lake basin through improvements of the fishery.
- An Implementation Plan that proposes a strategy to reduce mercury loads to Clear Lake, including load allocations and sediment compliance goals, was adopted. The Implementation Plan directs Responsible Parties to implement activities to have Clear Lake meet its water quality objectives. The Implementation Plan includes a mercury source analysis, load reductions, and implementation alternatives to achieve the water quality objectives.
 - *Source Analysis:* Clear Lake lies within a region naturally enriched in mercury. The large Sulphur Bank Mercury Mine (SBMM) on the shore of the lake and several smaller mines in the Clear Lake watershed are inactive. The Bradley Mining Company currently owns SBMM. The U.S. Environmental Protection Agency (USEPA) declared the SBMM a federal Superfund site in 1991. Since then, USEPA has completed several remediation projects, including regrading and vegetation of mine waste piles along the shoreline and construction of a diversion system for surface water runoff. The USEPA is currently conducting a remedial investigation to fully characterize the SBMM site in order to propose final remedies.

Staff estimated inorganic mercury loads entering Clear Lake for the following sources: ongoing inputs through groundwater, surface water, and flux to the air from the SBMM site; tributaries and other surface water that flow directly into the lake; and

atmospheric deposition. Also identified as a source is mercury deposited historically in the lake due to mine operations or erosion at SBMM that contributes to mercury concentrations in fish today. There is considerable uncertainty in the estimated loads from SBMM; therefore, staff used the maximum estimated load as a basis for load reductions. As USEPA collects additional data, the load estimates will be refined through regular reviews of the Basin Plan mercury strategy.

Staff estimated inorganic mercury loads leaving Clear Lake for the following outputs: flux to the atmosphere from the lake surface; Cache Creek downstream flow; and burial in sediment. The lakebed sediment consists of an active surficial layer, in which mixing, resuspension, deposition, and chemical cycling occur. Surficial sediment is also the primary site of bacterial activity that transforms inorganic mercury into methylmercury. Below the active layer, mercury becomes buried and removed from the cycle. The Implementation Plan proposed as part of the Basin Plan amendments focuses on removing mercury from the surficial layer of lakebed sediment.

- *Linkage Analysis and Load Allocations:* Levels of methylmercury in fish are assumed to be directly proportional to the concentration of mercury in surficial sediment. To meet the recommended water quality objectives, existing fish tissue concentrations would have to be reduced by 60%. A 10% margin of safety is added to account for uncertainties in the linkage analysis. Therefore, to meet the objectives, concentrations of mercury in surficial sediment must be reduced by 70% from existing levels.

To reduce surficial sediment concentrations of mercury by 70%, mercury loads must be reduced by 70% as well. The acceptable sediment levels will be met by the following reductions in existing loads:

- **Atmospheric Deposition:** Atmospheric deposition from the global pool of mercury is assumed to remain constant under water quality control provisions of this strategy. Therefore, the allocation is set at the load estimated to deposit on the lake surface from the global pool, 2 kg/year.
- **Tributary Inputs:** Mercury loads from the tributaries and direct surface water runoff into the lake should be reduced to 80% of existing inputs. These inputs vary with water flow. In an average water year, the estimated load and load allocation are 18 kg/year and 14.4 kg/year, respectively. The load allocation is applied to the tributary inputs as a whole. Efforts to meet the allocation should focus on identifying and remediating hot spots of mercury loading within the tributary watersheds. On average, sediments coming from the tributaries contain lower concentrations of mercury than lakebed sediments.
- **Sulphur Bank Mercury Mine:** The remainder of load reductions will come from reducing inputs from existing discharges and historical deposits from SBMM. The load allocation to the terrestrial mine site is 5% of ongoing loads. The load allocation to the active sediment layer in Clear Lake is 30% of existing sediment concentrations. Because mercury in groundwater is preferentially methylated, mercury transported in groundwater through the SBMM shoreline waste rock pile is limited to 0.5 kg/year. The load allocations are assigned to the owners of SBMM. Because SBMM is a Superfund site, CVRWQCB

requests that the USEPA continue its investigations and conduct remediation activities to achieve the proposed reductions.

On June 23, 2006, the CVRWQCB adopted Resolution No. R5-2006-0060 an Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Nutrients in Clear Lake (Nutrient TMDL), see Appendix B. The goal of the Nutrient TMDL is to lower nutrient inputs to Clear Lake so that the beneficial uses of fishing and wildlife habitat are attained. The Nutrient TMDL requirements are described below.

- The Nutrient TMDL includes a numeric target for chlorophyll-a within Clear Lake. Utilizing a water quality model, chlorophyll-a values can reach up to 73 µg/L and water quality in the lake would not be impaired. Thus, this value was chosen as the target to calculate the phosphorus load allocations for Clear Lake.
- The allocated loading of phosphorus to the lake is 87,100 kg per year. This represents a 40% reduction in average annual phosphorus loading. The 87,100 kg is allocated to point and nonpoint source dischargers.
- The Nutrient TMDL also includes an implementation plan to achieve the load reductions. The implementation plan is designed to achieve the required load reductions and eliminate the impairment to the beneficial uses in Clear Lake. The implementation plan directs Responsible Parties to estimate their loading to the lake and implement additional actions, such as best management practices to control phosphorus, if needed. Conditions in Clear Lake will be monitored to determine if the lake is in compliance with its beneficial uses. The Responsible Parties will be required to update the Central Valley Water Board on their progress towards meeting the phosphorus load reduction requirements.
- Recent improvements in water clarity may be a result of the erosion control work already completed by the County and other organizations, or it may indicate that factors other than phosphorus play a role in the occurrence of nuisance algae blooms. Further study is necessary before a determination can be made on the impairment status of the lake. For this reason, the Nutrient TMDL also recommends that additional studies be conducted to validate the chlorophyll-a target and load allocations and to determine the effect that other constituents (such as nitrogen or iron) might have on nuisance algae blooms in the lake.

This Monitoring and Implementation Plan (Plan) was prepared by the Responsible Parties and other stakeholders to implement the Mercury TMDL and Nutrient TMDL for Clear Lake.

Responsible Parties and the Stakeholder Group

The Responsible Parties and other stakeholders have agreed to cooperatively implement and develop a Plan that addresses both TMDL's in a public forum. They have formalized their intent and willingness to work together to implement the TMDL's in a Memorandum of Understanding (MOU), see Appendix C. The purpose of the MOU is to establish a Stakeholder Committee within the boundaries of Upper Cache Creek Watershed (UCCW) to be known as the Clear Lake TMDL Stakeholder Committee (CLTSC) and to define the terms and conditions under which the CLTSC will cooperate, coordinate activities and provide the necessary expertise and input to assist with the implementation of the Mercury TMDL for Clear Lake and the Nutrient TMDL for Clear Lake.

Appendix D includes the agendas and minutes for the CLTSC meetings.

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All parties have a mutual interest in controlling mercury and nutrients entering Clear Lake, meeting water quality objectives and share the following goals:

- A. Control: Combine resources to achieve required mercury and nutrient load reductions and to eliminate the impairment of the beneficial uses of Clear Lake.
- B. Information Exchange: Share information regarding best management practices, monitoring data and methods.
- C. Cooperation:
 - 1. Develop and implement a Plan to reduce the input of mercury and reduce the mercury concentrations in the lake sediments.
 - 2. Develop and implement a Plan to collect the information needed to determine what factors are important in controlling nuisance algae blooms and to recommend what control strategy should be implemented.

Mercury TMDL

The Bradley Mining Company, the owner of the SBMM, and any other responsible parties¹, Lake County, United States Bureau of Land Management (BLM), the United States Forest Service (USFS), and other land management agencies have been named as Responsible Parties and have received Load Allocations under the Mercury TMDL and will be required to submit a report to the CVRWQCB on their progress to meet the waste load allocations and to comply with the Mercury TMDL concurrent with the five year cycle for review and update of the Mercury TMDL. This report is due October 2008.

A majority of the load allocations are assigned to the SBMM. The SBMM was declared an EPA Superfund site in 1990. USEPA has implemented remedial actions to reduce mercury input and performed extensive investigations into the pathways mercury from the SBMM site has/is entering Clear Lake waters and the food web. CVRWQCB requests that the USEPA continue its investigations and conduct remediation activities to achieve the proposed reductions. The load reductions will come from reducing inputs from existing discharges and historical deposits from SBMM. The load allocation to the terrestrial mine site is 5% of ongoing loads. The load allocation to the active sediment layer in Clear Lake is 30% of existing sediment concentrations. Because mercury in groundwater is preferentially methylated, mercury transported in groundwater through the SBMM shoreline waste rock pile is limited to 0.5 kg/year. USEPA is addressing the terrestrial mine site and groundwater inputs as Unit 1 in the Remedial Investigation / Feasibility Study (RI/FS). The USEPA will be addressing the contaminated lake sediments as Unit 2 in a future RI/FS. The scientific studies, emergency work and RI/FS processes are a public process and has been proceeding over the last 17 years. Most of the stakeholders have been participating in this process. At this time, USEPA is not participating in the Stakeholder MOU process.

The BLM, USFS, Lake County and other land management agencies in the Clear Lake watershed shall submit plans for monitoring and implementation to achieve the necessary watershed load reductions. The loads of total mercury from the tributaries and surface water runoff to Clear Lake should be reduced by 20% of existing levels. In an average water year,

¹ USEPA will determine all the responsible parties for the SBMM. This may include all owners/mine operators since mining began at the site.

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existing loads are estimated to be 18 kg/year. Loads range from 1 to 60 kg/year, depending upon water flow rates and other factors. The load allocation applies to tributary inputs as a whole, instead of to individual tributaries. Efforts should be focused on identifying and controlling inputs from hot spots.

Nutrient TMDL

The County of Lake, City of Lakeport, City of Clearlake, California Department of Transportation, United States Bureau of Land Management, United States Forest Service, and irrigated agriculture have been named as Responsible Parties and have received Waste Load Allocations, and will be required to submit plan(s) to the Regional Water Board for the control of nutrients in Clear Lake. Waste load allocations are as follows:

NPDES facilities discharging to the lake or tributaries:

- a. Lake County Stormwater Permittees (Lake County, City of Clearlake, City of Lakeport) - 2,000 kg/yr
- b. California Department of Transportation (Caltrans) – 100 kg/yr

The load allocation for nonpoint source dischargers is 85,000 kg/yr average annual load (five year rolling average). The U.S. Bureau of Land Management (BLM), U.S. Forest Service (USFS), Lake County (County) and irrigated agriculture are responsible for controlling phosphorus discharges from those portions of the watershed within their respective authority.

The Responsible Parties that have participated in the CLTSC are follows:

- Lake County: As Lake County has jurisdiction over the largest portion of the watershed (218,709 acres). The Lake County Watershed Protection District (LCWPD), on behalf of the County, has taken the lead in forming the CLTSC and development of the Plan. Lake County and districts under the direction of the Board of Supervisors own and manage 4,928 acres within the Clear Lake watershed. In addition, the County manages 429.6 miles of roads within the Clear Lake watershed. Assuming an average right-of-way of 50 feet, this equates to an additional 2,603 acres. Urban areas of Lake County are subject to the NPDES Municipal Stormwater Permit (NPDES-Phase II).
- City of Lakeport: The City of Lakeport comprises 1,542 acres. The City also manages 588 acres outside the City limits, such as the wastewater treatment facility. The City of Lakeport is subject to the NPDES Municipal Stormwater Permit (NPDES-Phase II). The City of Lakeport has had limited participation in the CLTSC to date.
- City of Clearlake: The City of Clearlake comprises 6,766 acres. The City of Clearlake is subject to the NPDES Municipal Stormwater Permit (NPDES-Phase II). The City of Clearlake has had limited participation in the CLTSC to date.
- California Department of Transportation (CALTRANS): CALTRANS manages 16.5 acres in the watershed plus the road right-of ways for State Highway 20, 29, 53, 175 and 281. Assuming an average right-of-way width of 100 feet and 105.3 miles of road, this equates to an additional 1,276 acres. CALTRANS is subject to the NPDES Municipal Stormwater Permit (NPDES-Phase I). CALTRANS has been an active participant in the CLTSC. In August 2008, CALTRANS personnel informed the CLTSC that they would be submitting their own Monitoring and Implementation Plan.
- BLM: BLM manages 37,387 acres of the watershed. BLM has had limited participation in the CLTSC to date.

- USFS: USFS manages 30,696 acres of the watershed. The USFS has been an active participant in the CLTSC.
- Irrigated agriculture: Irrigated agriculture represents numerous agricultural operations that are subject to a Waste Discharge Waiver issued by the CVRWQCB. Permit requirements for irrigated agriculture are coordinated and managed by the Lake County Irrigated Lands Watershed Group (LCILWG), a member of the Sacramento Valley Water Quality Coalition. The LCILWG is administered by the Lake County Farm Bureau Board of Directors (LCFB). LCFB, on behalf of LCILWG, has been an active participant in the CLTSC.
- The Bradley Mining Company has not participated in the CLTSC.

Other participants in the CSLTC include:

- Central Valley Regional Water Quality Control Board
- West Lake Resource Conservation District
- East Lake Resource Conservation District
- Robinson Rancheria
- Big Valley Rancheria
- Sierra Club
- Habematolel Pomo of Upper Lake
- Elem Rancheria
- Scotts Valley Band of Pomo Indians

Existing Efforts of Stakeholders that Implement the Clear Lake TMDL's

Many efforts have been made by the Responsible Parties and stakeholders to reduce erosion and improve watershed health and water quality in the Clear Lake watershed. A detailed list of activities implemented by Responsible Parties and other stakeholders is included in Appendix E. Following is a summary of the major activities that have been, or are in the process of being implemented:

Lake County

Water quality improvement Clear Lake has been a major issue in Lake County, as a significant portion of Lake County's economy is based on Lake related tourism, and poor water quality adversely affects tourism. The Lake County Board of Supervisors has directed staff and appointed advisory committees to address water quality issues as they arise. Following is a brief summary of the County's efforts to improve water quality in Clear Lake.

Mercury: Contamination of the lake and elevated mercury levels in Clear Lake fish was documented in the early 1980's, leading to the fish advisory being issued by the Department of Health Services (DHS) (renamed the Department of Public Health in 2007) in 1987. County staff was involved in reviewing the documentation for the advisory and provided input to DHS on the advisory. Staff began following developments at the SBMM, which was assumed to be the primary mercury source within the watershed. When the SBMM was declared a superfund site in 1991, the Board of Supervisors appointed the primary contact with USEPA to be the Environmental Health Division of the County Health Department (EH). County staff, including EH, Lakebed Management, Public Works and Air Quality Management staff, worked closely with USEPA and their contractors in work related to the mine site.

County personnel worked closely with CVRWQCB staff during the development of the data and recommendations implementing the Mercury TMDL for Clear Lake.

In 2002, the LCWPD, a district governed by the Board of Supervisors, applied for a Proposition 13 grant to obtain data to supplement the limited watershed data available to the CVRWQCB used to develop the Mercury TMDL (draft form at the time). Delays in implementing the grant have occurred, during which the sampling protocols and philosophy changed from those anticipated during the grant application. In Fall 2005, initial stream sediment hotspot monitoring was begun throughout the Clear Lake watershed, as required by the Mercury TMDL. Aquatic monitoring at three stream gages to develop improved mercury loading estimates was begun in 2006. Data is being provided to the CVRWQCB for utilization in the five-year TMDL review cycle.

The Lake County Public Services Department which administers the County's solid waste disposal program and the Lake County landfill has participated in separating hazardous waste from the landfill bound waste stream for many years. A hazardous waste disposal program with scheduled free collection of hazardous wastes with the "Hazmobile" has been operated in cooperation with Mendocino County. Recycling facilities within the County also collect electronic equipment and televisions for recycling. This reduces the amount of hazardous materials, including mercury, that are introduced to the local environment.

Nutrients: Reducing the magnitude and frequency of nuisance blue-green algal blooms has been a high priority for the County since at least the 1960's, as the nuisance blooms discouraged recreational use of the lake and tourism. Some of the major activities of the County include:

- Clear Lake Algal Research Unit (CLARU), 1970-1975: The County cost shared this effort with the California Department of Water Resources (DWR). CLARU was formed to evaluate the causes of the nuisance algal blooms and to determine the potential effects of the diversion of the Eel River through Clear Lake on the water quality in Clear Lake and on the Eel River water (a proposal for the State Water Project). For five years, Dr. Alex Horne, UC-Berkeley, and co-researchers conducted numerous monitoring, tests and assessments on Clear Lake as they relate to algal growth. This led to a better understanding of the limnology of Clear Lake and a conclusion that excess phosphorus from nonpoint sources was the primary cause of the nuisance algal blooms.
- Clear Lake Water Quality Committee/Algae Committee, 1970-1989: This committee was formed by the Board of Supervisors as an advisory committee to represent the community and coordinate with CLARU and other efforts to reduce the impacts of nuisance blue-green algal blooms. After CLARU, much of the Committee's efforts were directed towards mitigating the nuisance conditions of the algae blooms and "treatment systems" in the lake. Around 1988, the Committee began approaching the problem on a watershed basis.
- Section 208 Grant: The County received a Section 208 grant from the State in 1979 for two projects.
 - A grading ordinance was developed to reduce construction related erosion and promote good grading practices. The original grading ordinance was adopted in 1982 and has been revised numerous times. The current ordinance was adopted in 2007 and regulates construction related activities, some agricultural grading and is

- consistent with NPDES municipal stormwater regulations. The ordinance adopts grading standards and increases development requirements for projects that are located in watercourse corridors to protect water quality.
- A Creek Management Plan was developed to regulate in-stream gravel mining to reduce damage to the environment. The original concerns were unsustainable gravel extraction rates and downcutting of stream channels, reducing groundwater supplies. The original Plan was adopted in 1981, and was updated in 1992 and addressed additional concerns such as erosion, traffic impacts, noise and habitat values. Implementation of gravel mining regulations has significantly reduced in-stream gravel mining in Lake County, with no major in-stream gravel mining operations permitted at this time. The reduction of instream gravel mining has reduced in-stream channel and bank erosion below historic levels and riparian habitat has been increasing, restoring the natural and beneficial functions of streams in the County. Significant reductions in major in-stream gravel mining operations during the latter 1980's may have contributed to the improved clarity experienced in Clear Lake since 1991.
 - Zoning Ordinance: The Lake County Zoning Ordinance includes "wetland" (Section 28) and "waterway" (Section 36) combining districts that place additional restrictions on development in with this zoning to protect habitat and water quality. These provisions are also included in the County's General Plan (1980) and are being included in the current update of the General Plan.
 - Shoreline Ordinance: Lake County has been delegated management of the public trust for Clear Lake. As part of these duties, the County has adopted the Shoreline Ordinance (Chapter 23 of the County Code). The Ordinance includes provisions to protect water quality (23-12) and limits the clearing of beach vegetation (23-15).
 - Clean Lakes Study: In 1990, the LCWPD received a grant from the State to partially fund a Diagnostic/Feasibility Study for Clear Lake. The purpose of the Study was to update the findings of CLARU, as lake conditions had changed since the early 1970's and 15 years of lake data collected by DWR had not been analyzed. The LCWPD hired UC-Davis (Drs. Peter Richerson and Tom Suchanek) to conduct the study. In 1991, the lake clarity increased dramatically, more than doubling the secchi depths measure in the previous 20 years. The increased clarity encouraged the rapid expansion of aquatic macrophytes in the lake. In 1994, The Causes and Control of Algal Blooms in Clear Lake (Clean Lakes Study) was published. The Clean Lakes Study concluded excess phosphorus was a cause of the algal blooms, however, there were indications that iron or other factors may contribute to the algal blooms. Insufficient funds and time was available to further analyze the system. Unfortunately, insufficient data was available to analyze the post 1991 conditions with the significantly increased clarity (which has persisted through 2007). In July 1994, the County Board of Supervisors adopted the "Implementation Plan for Recommended Actions in the Clean Lakes Report" that identified 11 primary actions to improve water quality in Clear Lake, see Appendix E. Many of these actions have been, or are being, implemented, see Appendix E.
 - Watershed Assessments: Since the Clean Lakes Report, the LCWPD has pursued projects that reduce the nutrient input to Clear Lake and build public awareness. Projects include:

- Scotts Creek Watershed Project, 1994-1998: This was a demonstration project for improving watershed health. Several stream restoration projects were implemented, water quality monitoring was conducted, and an extensive community outreach program was implemented. This project was conducted in cooperation with the BLM, who manages Cow Mountain which includes the majority of the upper Scotts Creek watershed.
 - Watershed Awareness Program, 1995-1996: The goal was to encourage widespread public understanding of solutions to the Clear Lake watershed's erosion problems.
 - Community Entrepreneurial Watershed and Water Quality Program, 1996-1998: The goal was to enable the community to implement BMP's to control erosion and nutrient loading to Clear Lake.
 - Clear Lake Basin Watershed Analysis, 1996-1999: This project was to assess the erosion sources within the Clear Lake watershed and develop management recommendations. Other objectives included reviewing public and private land management practices, expanding outreach and developing management recommendations and an implementation plan/checklist.
 - Upper Lake Watershed Analysis, 1997-1999: In cooperation with the USFS Mendocino National Forest, a Federal Watershed Analysis was prepared for the Upper Lake watershed (Middle and Clover Creek watersheds).
 - Wetlands Planning Partnership, 2000-2004: This project updated the wetland inventory surrounding Clear Lake and developed a model site management plan for wetlands.
 - Invasive weed eradication, 2001-present: the LCWPD, County Agriculture Department and local resource conservation districts have taken an active role in eradicating non-native invasive weeds which damage riparian corridors, especially arundo donax and tamarisk. These weeds have been shown to displace natural riparian vegetation, disrupt flows, increase erosion and damage the natural and beneficial functions of streams. Eradication of these plants will improve stream and watershed health, improving overall water quality.
- Watershed Groups: In 1989, the Clear Lake Basin Resource Management Committee (Basin Committee) was created following the Coordinated Resource Management Planning (CRMP) model. The Committee's purpose is to maintain and enhance the ecosystem and economy of the Clear Lake Basin. The Basin Committee involved private citizens and local, state and federal agencies. In 1996, the Basin Committee was expanded to encompass the entire county and was renamed the Lake County Coordinating Resource Management Committee (RMC). The Basin Committee/RMC has fostered a cooperative working relationship among the agencies involved and has helped coordinating many projects, small and large. The RMC continues to meet quarterly facilitating cooperation and sharing of information. The RMC has three subcommittees, the Water and Land Subcommittee, the Clear Lake Advisory Committee (CLAS) and the Biological Resources Subcommittee.

The CRMP process through the RMC has facilitated public cooperation and the formation of nine watershed groups within or including the Clear Lake watershed. These watershed groups are coordinated through the local Resource Conservation Districts, and will be discussed later in this document.

- Since 1995, the LCWPD has been pursuing the Middle Creek Flood Damage Reduction and Ecosystem Restoration Project (Middle Creek Project). The Middle Creek Project consists

of acquiring 1,650 acres of reclaimed land at the north end of Clear Lake and restoring it by breaching the levees and allowing the land to flood. Approximately 1,400 acres is below the normal high water level of Clear Lake and will become wetlands and open water. The Scotts Creek and Middle Creek watersheds, which comprise approximately one half of the Clear Lake watershed, drain through Rodman Slough adjacent to the Middle Creek Project area. These two watersheds provide 57 percent of the inflow and 71 percent of the phosphorus loading to Clear Lake. By allowing these flows to pass through the restored wetland, the phosphorus input from these watersheds will be reduced by approximately 40 percent. Reconnection of this large, previously reclaimed area as a functional wetland is anticipated to have a significant affect on the watershed health and the water quality of Clear Lake. The Feasibility Study and environmental documentation (EIS and EIR) is complete and Federal funding has been authorized. The LCWPD has begun purchasing properties in the project area (134 acres as of December 2007) and continues to seek additional funding for project implementation. In November 2007, the Federal Water Resources Development Act became law which authorizes the U.S. Army Corps of Engineers to participate in the Middle Creek Project. Additional Federal legislation appropriating money for the project and transferring the "USA-In Trust" to properties outside of the project boundaries are required. The Lake County Board of Supervisors, the LCWPD and the Robinson Rancheria have been lobbying the Federal representatives to pass this legislation.

- In 2000, the City of Lakeport, the City of Clearlake and portions of the County of Lake were informed that they were subject to NPDES Phase II Stormwater Regulations. In 2003, a joint Stormwater Management Plan was filed with the Central Valley Regional Water Quality Control Board describing what actions are being taken to reach compliance with the State General Permit by October 2008. The Stormwater Management Plan describes how the County and cities will implement six required Minimum Control Measures:
 1. Public Education and Outreach on Storm Water Impacts
 2. Public Involvement/Participation
 3. Illicit Discharge Detection and Elimination
 4. Construction Site Storm Water Runoff Control
 5. Post-Construction Storm Water Management in New Development and Redevelopment
 6. Pollution Prevention/Good Housekeeping for Municipal Operations

The County and the LCWPD implementing the following:

1. Coordinated meetings of the Stormwater Advisory Council, which includes all three permittees.
 2. Developed outreach materials for the County and cities. Separate documents have been prepared for the general public and the construction related businesses.
 3. Promoted and supported the Adopt-a-Road and Annual Stream Cleanups.
 4. Developed and maintained a Stormwater Program website.
 5. Adopted a Stormwater Management Ordinance
- County personnel worked closely with CVRWQCB staff during the development of the data and recommendations implementing the Nutrient TMDL for Clear Lake. County personnel reviewed the available water quality data for Clear Lake to determine the cause of the improved clarity that had been experienced since 1991. The data collected by DWR did not show significant changes in the chemical water quality in Clear Lake, however, it has

demonstrated that consistently higher secchi depths have occurred since 1991. Working with the CVRWQCB staff, revised implementation measures were developed and implemented for the Nutrient TMDL for Clear Lake.

- **Wastewater Treatment:** The Lake County Sanitation District (Lacosan) has upgraded its three wastewater collection and treatment facilities in the Clear Lake watershed to reduce the discharge of wastewater, both raw and treated, into Clear Lake. An active program to reduce infiltration and inflow of stormwater into the collections system has been ongoing since the 1990's, and pumping stations have been upgraded to reduce backups and overflows. From the 1970's treated wastewater had been used for pasture irrigation in the watershed and was not considered a discharge. With growth and limited storage of treated wastewater, overflows of treated wastewater reservoirs occurred. In order to reduce overflows, Lacosan implemented a program to pump treated wastewater through a pipeline to the Geysers Geothermal Area for deep injection and recharge of the geothermal steam fields. In 1997, the first phase of the pipeline was completed and effluent from the Southeast Regional Treatment Plant was pumped to the Geysers. In 1999, treated wastewater from the Clearlake Oaks County Water District's Wastewater Treatment Plant was pumped to the Southeast Regional Treatment Plant, and then pumped to the Geysers. In 2003, the Northwest Regional Treatment Plant's effluent was added to the system. The pipeline system has reduced overflows of treated wastewater and probably reduced nutrient runoff from the pastures formerly irrigated with treated wastewater (not documented). Investigations are underway that would add the treated effluent from the City of Lakeport's and Kelseyville's wastewater treatment facilities to the pipeline and reduce overflows from these facilities.

City of Lakeport

The City of Lakeport has had limited participation in the CLTSC, therefore, limited information is available. Related programs include:

- The City is a co-permittee with the City of Clearlake and the County of Lake in the Municipal Stormwater Program. Components of the Storm Water Management Plan implemented include:
 - Municipal Operations:
 - i. The City adopted Resolution No. 2272 in 2006 which, by reference, adopted the Municipal Operations BMP Handbook produced by the California Stormwater Quality Association (CASQA). BMP's as set forth in the CASQA handbook for municipal operations have been implemented. Furthermore, certain practices at the City's corporation yard have been modified in order to prevent stormwater pollution.
 - ii. Street sweeping BMP's set forth in the CASQA handbook for municipal operations have been implemented. Furthermore, street sweeping takes place according to a set schedule and accumulated debris is properly disposed of. A concrete wash area is used to wash out the street sweeper.
 - **Construction Site Controls:**

- i. Storm water issues are regularly considered during plan reviews by Planning and Building staff members. The building inspector is well-trained in the implementation of storm water facilities and BMP's at construction sites.
 - ii. All commercial projects and all large residential projects are subject to the California Environmental Quality Act (CEQA). Said projects are subject to a thorough CEQA review. City-produced environmental review documents address water quality issues and incorporate mitigation measures intended to eliminate or minimize detrimental water quality impacts. A standard mitigation measure for all new commercial development projects is the installation of an adequate number of oil/sediment interceptors within the new parking lot areas. Maintenance of the interceptors is also required.
- Public Involvement and Participation:
 - i. The City of Lakeport initiated a stencil program in FY 2006/2007 including acquisition of stencil which includes a fish symbol and states "No Dumping-Flows to Clear Lake." Approximately 30 storm drains in downtown Lakeport were stenciled in FY 2006/2007.
- Stormwater Management Ordinance:
 - i. Storm Water Management Ordinance (Ordinance No. 853) was adopted by the City in June 2006.
- Erosion Control Ordinance:
 - The City has adopted a variety of erosion control regulations which are set forth in Chapter 17.20 of the Lakeport Municipal Code. The soil stability and erosion control measures set forth in the Code are required in areas where exposed soils or other conditions have the potential to create water quality impacts, damage to Clear Lake and tributary streams, and other related impacts.
- Zoning Ordinance:
 - The City Zoning Ordinance includes a Shoreline Development (SD) Combining District (Chapter 17.18) which extends along a majority of the City's Clear Lake shoreline. The purpose of the SD Combining District is to "protect and preserve environmentally sensitive areas adjacent to the Clear Lake shoreline and to prevent degradation of wetland and riparian areas, reduce erosion and water quality impacts and enhance the fishery resources and view corridors."
- City of Lakeport Website
 - The City maintains a web page devoted to water quality including the City's participation in the Lake County Clean Water Program, <http://cityoflakeport.com/departments/page.aspx?deptID=39&id=69>. The page provides links to the Storm Water Management Plan and the City's Storm Water Management Ordinance as well as links to other websites including the county's Clean Water Program and the California Water Resources Control Board. The page also advises residents to "Please do your part, don't wash mud, oil, trash, or other pollutants into the street or gutters."
- Wastewater Treatment:

- The City of Lakeport Municipal Sewer District (CLMSD) upgraded its wastewater collection and treatment facility located in south Lakeport in 2008. Said improvements expanded the holding capacity at the facility and are expected to eliminate unauthorized wastewater discharges into Clear Lake. The City has also established an inflow and infiltration (I&I) program which has successfully reduced the amount of stormwater entering the wastewater collection system and thus increased the total wastewater capacity at the treatment facility.
- Mandatory Trash Collection:
 - The City adopted Ordinance #827 in 2003 which established a mandatory weekly trash collection program for all residents in Lakeport. Implementation of this Ordinance has significantly reduced the nuisance outdoor accumulation of trash and debris in our community. This Ordinance also requires all solid waste to be stored in a closed toter, receptacle, bin or drop box. These measures have a positive effect on water quality by reducing the amount of open and uncovered trash stored outdoors subject to rainfall and subsequent storm water runoff to the storm drain system and, ultimately, Clear Lake.
- California Building Code
 - The City of Lakeport has also adopted the 2007 California Building Code (CBC). Chapter 18 of the CBC addresses soil grading activities and prescribes erosion control methods and other activities intended to eliminate or minimize water quality impacts.

City of Clearlake

The City of Clearlake has had limited participation in the CLTSC, therefore, limited information is available. Related programs include:

- The City is a co-permittee with the City of Lakeport and the County of Lake in the Municipal Stormwater Program. The City has adopted a Stormwater Ordinance and Rules and Regulations Establishing Performance Requirements and BMP's to implement the program.
- In June 2008, the first City-wide Clean Up day was held. Volunteers picked up trash and debris all over the city.
- To reduce the amount of sediment going to Clear Lake, the City has a street sweeping program. The program includes street sweeping, cleaning drainage ditches, flushing storm drains. Sediment removed from the drainage facilities is removed and hauled to the land fill.

CALTRANS

CALTRANS has been an active participant in the CLTSC. Related programs include:

- CALTRANS is an individual permittee under the Municipal Stormwater Program. CALTRANS has been implementing BMP's to reduce erosion and transport of pollutants from construction and maintenance projects since the early 1990's as required by their permit.
- The LCWPD's mercury hotspot sampling program has identified a hotspot at the abandoned Utopia Mine. The abandoned mine adits are located in the State HWY 20 right-of-way

(milepost 16.35). The CVRWQCB has requested CALTRANS address the potential for mercury contamination entering State waters within their right-of-way at this location.

BLM

BLM has had limited participation in the CLTSC to date, therefore, limited information is available. Related programs include:

- BLM cooperated with the LCWPD during the Scotts Creek Watershed Project during the mid 1990's. Due to the increased awareness during this project, BLM took an active role in relocating, reinforcing and improving Off Highway Vehicle (OHV) trails in the South Cow Mountain Recreational Area to reduce erosion and damage to aquatic systems from their trail system.
- In 2005, BLM undertook the restoration of the eroded gully system in Eight Mile Valley. The project design obliterated a gully system caused by historical grazing and farming utilizing the Plug & Pond methodology. This technology implemented the filling of the gullies with borrowed material from the creation of ponds, reestablishing sheet flow on the meadow floor, thereby raising the groundwater level in the valley, reducing erosion and enhancing sediment deposition. Severe winter storms in December 2005 damaged the restoration, so the full benefits have not been realized. BLM is working with the West Lake Resource Conservation District (WLRCD) pursuing additional funding to repair the restoration project.

USFS

The USFS has been an active participant in the CLTSC. Related programs include:

- There are 52 miles of road and 7 miles of OHV trails in the Middle Creek watershed. Sections of these roads and trails contribute sediment to streams feeding Middle Creek. A road inventory and maintenance work is needed to correct the road drainage problem areas. Currently a forest hydrologic technician is inventorying the roads in the watershed, which focuses on road sediment that enters a stream course tributary to Middle Creek. Inventory items are the cut slope, inside drainage ditch, road bed, slumps/slides, fill erosion and plugged culverts. This inventory will assist in prioritizing road drainage improvement projects. District OHV personnel have inventoried the trails and identified their need for maintenance. In 2008-2009, an improved inventory of the roads within the Clear Lake watershed will be developed.
- In 1996, the Fork fire burned approximately 30% of the Middle Creek watershed (16,529 acres), and gave impetus to conduct fuel reduction projects to reduce the potential of a wildfire which can destroy life and property as well as increase sediment input to the lake. The following projects are taking place in the watershed.
 - Prescribed Burning: In order to reduce future wildfire sizes, anywhere from 100 to 400 acres of prescribed burning takes place per year. Best management practices are utilized to reduce impacts to stream courses and unstable lands.
 - Fuel Break: A 150 foot wide fuel break is being established along the Elk Mountain road near Lone Pine to the watershed divide. In this fuel break, brush, small conifers and other ladder fuel vegetation is being removed leaving overstory conifers and oaks.

- Fuel Reduction: The Horse Mountain fuels reduction project of thinning conifers and removing understory vegetation is taking place in the Grizzly Canyon subwatershed of West Fork. The end result will be a well spaced conifer stand with little remaining ladder fuels.
- Livestock Grazing: The Elk Mountain grazing allotment, consisting of about 80 cow/calf (180 head), are on the allotment between 5/16 and 6/30. Most grazing takes place on the type conversion on Pitney Ridge which has very few stream courses. The range analysis done in Spring 2007 indicated very little grazing impact on Pitney Ridge, Pilot Grove type conversion, glades near Elk Valley and Long Meadow.
- Watershed Improvement
 - Middle Creek OHV area: OHV funding is available and plans are made to convert an OHV novice riding area along West Fork at the Middle Creek campground into a "green riparian strip". Riders have created trails immediately adjacent to West Fork and during the wet season these trails drain soil into the stream. Plans are to make about a 200 feet wide riparian area along the length of this riding area which will be reshaped, tilled, mulched and planted with shrubs and grass. West Lake RCD will be contracted to water the planted woody species.
 - Middle Creek bank stabilization: High water of 2006 scoured several hundred yards of streambank leaving the channel thalweg against the bank. To move the channel off the bank, eleven rock vanes were constructed along the east bank of East Fork across from the Middle Creek campground to divert the flow back towards the center of the channel. Two areas of streambank riprap were placed along the novice riding area on West Fork. The riprap will divert some of the water flow off the bank allowing willows and other vegetation to establish.
 - Landslide Identification: In 2007-2008, a Forest Service geologist will map the active landslides in the Middle Creek watershed using 2003 aerial photos. Sediment contributions from the landslides will also be estimated.
 - Soil Testing: Soil samples were taken at the Middle Creek campground novice riding area and East Fork Middle Creek streambed and streambank at the location of the rock vanes. Samples were sent to Fruit Growers Laboratory for analysis of phosphorous and mercury. Phosphorous results were very low, <13 ppm. Mercury was not detected in the streambank, however 0.03 mg/kg were found in the streambed, which is slightly above the detectable level.

Irrigated agriculture

LCIAWG is a member of the Sacramento Valley Water Quality Coalition (SVWQC) that was formed to meet the requirements of the Irrigated Agricultural Lands Regulatory Program. The LCIAWG was formed by the Lake County Farm Bureau and is administered by the Board of Directors. The group submitted a summary report to the SVWQC in 2004 and reports to the coalition twice a year as to outreach and communications to growers. Growers were required to "opt-in" to the watershed group with a deadline for joining a watershed group on December 31, 2006. Our current enrollment is 169 participants, which include 621 individual parcels that include 13,229 irrigated acres in both the Cache Creek and Putah Creek Basins.

- A monitoring plan was put into place and approved by the Regional Board in 2005 that met the requirements of the waiver conditions. Growers are assessed fees to carry out the

conditions of the waiver, which result in approximately \$34,000.00 being spent annually on the administration and monitoring of the program.

The SVWQC has contracted with Larry Walker and Associates to handle reporting requirements of the waiver to the Regional Board, as well as contracting the monitoring specifics to Pacific EcoRisk. A technical committee from the SVWQC works with Larry Walker and Associates on the monitoring plans and Quality Assurance standards.

Our monitoring consists of a monitoring plan that meets the requirements of the Phase I and Phase II monitoring requirements of the waiver program. Our monitoring results have shown no Irrigated Lands Program (ILP) water quality objective exceedences during the past two years, except for high rates of E-Coli and one exceedence of DDT, which was below the ILP MRP target reporting limits, but is still above the California Toxic Rule (CTR) criterion (0.00059 ug/L). We have requested that our sampling for the E-Coli be analyzed further to identify the cause, large animal, bird, human, etc. We have not received results from the analysis taken during the 2006/2007 monitoring season.

- On the local level, our watershed group works with other organizations, (i.e. Lake County Wine Grape Commission, Natural Resource Conservation Service, Agricultural Commissioner's office and the local Resource Conservation Districts), with outreach programs to growers with information as to monitoring results and management practices that may have a positive impact on surface water runoff.
- The LCIAWG is currently working on a data base that will summarize various management practices that participants have incorporated into their farming operations. This information will also show where educational workshops might need to be implemented in the future.

Other Stakeholders Activities

East Lake and West Lake Resource Conservation Districts: Both the East Lake and West Lake Resource Conservation Districts (ELRCD and WLRCD) assist landowners and stakeholders to participate in watershed management decisions.

- The WLRCD and ELRCD have obtained numerous Watershed Coordinator Grants to support watershed stewardship in the County. The objective of the Coordinator(s) is to establish biological and habitat assessment citizen monitoring team, provide coordination with other agencies, provide a watershed coordinator to work with grass roots watershed groups, coordinate a countywide cleanup day, increase public awareness of habitat loss by using preservation of local native oak woodlands.
- Formed under the Coordinated Resource Management and Planning (CRMP) process, eight watershed groups have been established in the Clear Lake basin (Upper Cache Creek Watershed - UCCW). Seven of these groups are currently active, and are pursuing many different projects within the boundaries of the watershed.
 - Three groups are currently conducting watershed assessments under a Proposition 50, CALFED Watershed Program grant, administered by the Department of Water Resources, which was secured by the WLRCD. The groups in the Kelsey Creek, Middle Creek, and Scotts Creek watersheds are involved in studies that will catalogue existing

data, identify data gaps, and collect new data as funds allow. As part of the grant, the Clear Lake Integrated Watershed Management Plan will be completed, which will provide guidance for implementing projects to improve or enhance watershed health.

- Aside from the assessments, all of the groups have been involved in “hands-on” projects for many years. The Middle Creek CRMP conducts annual creek cleanup events removing debris and trash from illegal dump sites along the stream banks of Middle Creek. This group has conducted creek walks along a five-mile reach of Middle Creek; taking inventory of non-native invasive weeds, erosion sites, riparian vegetation, and habitat values. In 2000, CRMP member Robinson Rancheria Band of Pomo Indians received a \$108,000 Bureau of Indian Affairs grant to implement ten streambank restoration projects and conduct six culvert repairs along a three-mile reach of Middle Creek. The project was implemented in cooperation with the CRMP. This group also participates in community events to help educate the public about contributions they can make to improve the watershed.
- The Big Valley Watershed Council conducts annual cleanup events along a two-mile reach of Kelsey Creek, enlisting volunteers from local youth groups to assist. The group participates in community events hosting an informational booth to encourage public participation in watershed management.
- The Scotts Creek Watershed Council conducts annual creek cleanup events along two miles of Scotts Creek and South Fork Scotts Creek in cooperation with the Bureau of Land Management. The Council participates in an ongoing *Arundo donax* eradication project on Pool Creek in their watershed. The Council was instrumental in drawing attention to fuel load issues in the watershed. The group hosted tours in cooperation with BLM to educate the public about the need for a firebreak, and supported the WLRCDC in obtaining funds to construct a two-mile firebreak across private property. This effort created a contiguous five-mile firebreak providing protection to the watershed from catastrophic wildfire.
- The Lower Lake Watershed Council conducts annual creek cleanups in different streams each year. The Council has developed, funded, and implemented a habitat restoration demonstration project on Seigler Canyon Creek. The project is on School District land and involves high school students in a “hands-on” restoration project. The project, in addition to improving habitat, will address several erosion sites in the project area. In addition to the habitat restoration project, Carle High School Science students participate in water quality monitoring in the Seigler Canyon Creek Watershed. The students sample turbidity, dissolved oxygen, pH, temperature, total orthophosphate, and nitrates.
- The Nice Watershed Group is a proactive group that addressed a serious erosion problem in their watershed. They were successful in encouraging the Lake County Board of Supervisors to adopt an illegal OHV riding ordinance to address illegal riding and related erosion issues. This group conducts a spring and fall cleanup at several illegal dumping sites in their watershed.
- The Chi Council is a group of stakeholders interested in the preservation of the Clear Lake hitch (*Lavinia exilicauda chi*), a listed “Species of Special Concern” by the California Department of Fish and Game. Each year the Council conducts migratory

counts of hitch populations in an effort to evaluate the health of the species. The group is conducting fish barrier inventories and habitat studies. Members of the Council conduct basic water quality monitoring in conjunction with collecting migratory run data to better understand the trigger of the run.

- The Schindler Creek/High Valley CRMP is an inactive group at this time. The group originally formed to address erosion issues in their watershed. The group successfully conducted a watershed assessment with the assistance of the Natural Resources Conservation Service (NRCS). The group, with the aid of the East Lake Resource Conservation District, received funds from the California Department of Water Resources, Urban Stream Restoration Program to implement a streambank stabilization project along a one-mile reach of Schindler Creek. Once the project was completed, the CRMP disbanded, but there is a strong interest among many of the landowners to revitalize the group.
- The Lucerne Watershed Council is the newest group to join Lake County's family of watershed groups in the UCCW. The group formed to address streambank erosion, illegal dumping, invasive weeds, and many other issues in the watershed. The WLRCD is assisting this group to formalize and develop projects to implement in their watershed.
- Under the same grant which is funding the three watershed assessments, yet another watershed group known as the Upper Cache Creek Watershed Alliance (Alliance) is in the formation stages. This group will not only be a support unit for the other watershed organizations, but will hold a series of public workshops to help educate the public in regard to watershed health.

The ELRCD and WLRCD conduct education and outreach events during the year providing information to the public about water quality. Each year the Districts host an annual education event for middle school students. The "Kids-in-the-Creek" event brings students out of the classroom and into the watershed to learn about related issues. Eight to nine stations are displayed along Middle Creek where students listen to presentations from professionals about watershed health and natural resource protection.

The WLRCD and ELRCD's host an information booth at the Lake County Fair to provide information to the public concerning natural resource protection. Thirty plus volunteers from the watershed groups help staff the booth over the four-day event, meeting and greeting landowners and interested citizens.

- The WLRCD and ELRCD also participate in a tri-county, multiple agency committee to address natural resource issues in the Cache Creek Watershed. Known as the Cache Creek Watershed Forum, the committee meets quarterly to discuss common concerns throughout the watershed, collaborate on projects, and host public meetings to provide public education.
- WLRCD and the Bureau of Land Management (BLM) have worked cooperatively for many years implementing restoration projects, Off Highway Vehicle (OHV) trail maintenance, and trail improvements to reduce erosion in the South Cow Mountain OHV Recreation Area. The recreation area is one of Northern California's most popular riding areas, receiving up to 50,000 visitors each year. The partnership has allowed for the removal of stream crossings,

erosion control management at crossings, and trail maintenance to reduce impacts in the watershed.

Most recently, a 16 acre meadow restoration project in Eight Mile Valley was implemented by BLM and West Lake RCD only to suffer severe damage from the 2005/2006 storm events. The storms caused the failure of the control structure, creating the loss of approximately two-thirds of the restoration project. Both BLM and West Lake RCD are searching for funding to make the necessary repairs to return to pre-storm conditions. Eight Mile Valley project is of vital importance to the Scotts Creek Watershed, as it would allow for the slow release of water year-round and retain sediment on site.

- The WLRCD and ELRCD are currently in the development stage of a coordinated permit program. This program, a partnership with NRCS, proposes a set of agency agreements that facilitate conservation work on private lands. The goal of the program is to improve water quality and wildlife habitat in Lake County's two major watersheds, which includes the UCCW. This program would allow for a streamlined permit process for landowners who meet the established criteria. The best management practices selected for this program should assist with the improvement of water quality and the reduction of sediments to Clear Lake.
- The primary goal for the WLRCD, with the development of the Upper Cache Creek Stream Team, was to educate and involve the stakeholders in the Upper Cache Creek Watershed in the monitoring and evaluation of existing and potential restoration sites in the watershed. A series of bioassessment workshops, along with ongoing field training, was the perfect tool to educate citizens about the contributions they could make toward improving water quality. Stakeholders learned that they *can* contribute and play a major role in the health of their watershed.

Volunteers were trained to capably perform site surveys that included the recording of bioassessment field data and the evaluation of physical habitat quality. Benthic macroinvertebrate samples were taken according to required specifications for the Surface Water Ambient Monitoring Program (SWAMP). Further evaluation of the resulting taxonomic worksheets could provide information related to nutrient issues in the monitored streams.

Robinson Rancheria:

- In 2000, the Robinson Rancheria Band of Pomo Indians received a \$108,000 Bureau of Indian Affairs grant to implement ten streambank restoration projects and conduct six culvert repairs along a three-mile reach of Middle Creek. The project was designed and implemented in cooperation with the Middle Creek CRMP Group and the LCWPD.
- The Rancheria participates in community events to help educate the public about contributions they can make to improve the watershed.

Big Valley Band of Pomo Indians: The Big Rancheria has implemented the following activities to improve water quality:

- Shoreline cleanups, including patrolling for solid or hazardous waste

- Marina SPCC Plan in place. Many employees working at EPA or the Hotel have been trained in spill prevention or control.
- Big Valley Storm Water Management Plan – annual sampling of storm water, pre-storm clean outs of storm drains in parking lots, periodic inspection of storm drains.
- Low toxicity pesticides used, if at all, on the Rancheria
- Erosion control practices are implemented during any construction

Existing Efforts of Stakeholders that Implement the Clear Lake TMDL's

The Stakeholders have agreed to the following activities to implement the TMDL's:

Stakeholders will continue to implement the programs described above to reduce nutrient and mercury contributions to Clear Lake.

Stakeholders should form partnerships and pool resources to accomplish the tasks identified in the Nutrient and Mercury TMDL's. Resources include, but are not limited to: staff time, sharing of data and reference material, financial support, and facilitating access to funding sources.

Nutrient TMDL

The TMDL requires the Responsible Parties to develop and implement a plan that addresses the following topics.

Studies to assess the current limnological conditions and to determine the appropriate measures for Clear Lake to meet the Basin Plan objectives:

The Clean Lakes Study² was completed for the LCWPD in 1994, and using the data available attempted to determine the cause of the nuisance blue-green algal blooms in Clear Lake. Just as the Study was starting, Clear Lake changed drastically with reduced blue-green algal blooms, increased clarity (secchi depths essentially doubled) and aquatic macrophytes became more prolific. Insufficient data and funds were available to fully understand the parameters that cause these blooms. The study concluded that phosphorus was a major cause of the algal blooms and could be reduced, however, other parameters such as iron and internal nutrient cycling probably play a major role in algal productivity.

Analysis of the water quality data through 2002 by LCWPD staff indicated that while in-lake phosphorus levels had not decreased significantly below the levels measured during the 1980's, the increased clarity has continued. No major changes in lake chemistry were noted during this analysis. It has been the LCWPD's position that this indicates that phosphorus reduction is not the only action required to improve water clarity and quality. This, and subsequent, data needs to be analyzed to determine what changes have occurred that have led to the increased clarity.

Subsequent studies on the lake by UC-Davis researchers have indicated the sulfate budget was increased significantly concurrent with mining activities at Sulphur Bank, which may have

² Richerson, Peter J., Suchanek, Thomas H., Why, Stephen J., The Causes and Control of Algal Blooms in Clear Lake, Clean Lakes Diagnostic/Feasibility Study for Clear Lake, California, July 1994

affected iron cycle and the internal phosphorus loading in the lake, potentially causing increased algal productivity³. Additional research is necessary confirm these hypotheses.

Other hypotheses proposed as the cause for the high blue-green algal populations are changes to the Clear Lake food chain caused by species introduction, i.e. largemouth bass, catfish, threadfin shad, silversides, and other management efforts, i.e. DDE spraying in the 1950's. Data is limited on food chain changes and has not been analyzed as it relates to algal productivity⁴⁵.

LCWPD has made initial contacts with Dr. Geoff Schladow, UC-Davis and Tahoe Environmental Research Center, about conducting these additional studies, including analysis of the updated data and additional experiments to confirm or disprove several hypotheses that have been proposed as the cause of the high algal productivity in Clear Lake. Dr. Schladow expressed interest in assisting the County in its efforts to determine the cause of the high productivity and nuisance algal blooms. As numerous researchers from UC-Davis have conducted recent research on the Clear Lake ecosystem and developed several hypotheses, there would be certain benefits to contracting with UC-Davis for updating the Clean Lakes Study. The LCWPD is currently working with Dr. Schladow to develop a scope of work for updating the Clean Lakes Study. Limited funding is currently available to begin this process.

At this time, there are limited funds available to the CLTSC to contract for the additional research. The CLTSC will continue to monitor available grant funding for funds that are appropriate for updating the Clean Lakes Study.

The CLTSC recommends the following strategy for assessing the current limnological conditions and to determine the appropriate measures for Clear Lake to meet the Basin Plan objectives:

- Stakeholders should make available limnological and related data, including associated metadata, for the assessment.
- Obtain additional funding to evaluate the limnological data collected to date. Chemical and biological data should be evaluated to determine if there is a causal relationship between lake and watershed water quality parameters and the changes in lake clarity and frequency of nuisance blue-green algal blooms. Biological experiments should be conducted as necessary to evaluate the various hypotheses regarding algal productivity.
- Determine, as data and information permits, the pre-European condition of Clear Lake to establish a baseline of Clear Lake's water quality (natural conditions).
- When causal relationships are determined, they should be evaluated to determine management and other actions necessary to improve lake water quality to meet the natural conditions determined above.
- When the above tasks have been completed, the Stakeholders should conduct a public process to evaluate the findings and establish criteria for determining when Clear Lake is no longer impaired for nutrients. Input from the scientific community and the public will be

³ Richerson, Peter J., Suchanek, Thomas H., Zierenberg, Robert A., Osleger, David A., Heyvaert, Alan C., Slotton, Darell G., Eagles-Smith, Collin A., Vaughn, Charles E., Anthropogenic Stressors and Changes in the Clear Lake Ecosystem as Recorded in Sediment Cores, Ecological Applications, in publication

⁴ Personal communication, Dr. Alex J. Horne, University of California - Berkeley

⁵ Personal communication, Norman Anderson, Biologist (retired), Lake County Vector Control District

utilized in the process. The "impairment criteria" developed through this process will be presented to the CVRWQCB for consideration and incorporation into the Basin Plan.

Appropriate monitoring for evaluating conditions in the lake:

There are multiple ongoing and historical monitoring programs in the Clear Lake watershed. These programs include:

California Department of Food and Agriculture

The California Department of Food and Agriculture (CDFA) monitors the application of herbicides utilized for the eradication of hydrilla. Prior to each treatment, samples are collected and the temperature, pH, dissolved oxygen, conductivity and secchi depth are determined. Water temperature profiles may also be created to determine if the lake is stratified at the sampling sites. This data is measured the day before treatment, three days after, seven days after and weekly up to 35 days after treatment. In addition, the water is analyzed for content of the herbicide being applied (typically copper or Fluridone. Samples are also collected at the "inlet" (Rodman Slough) and outlet of the lake (Cache Creek) and analyzed for the same constituents. This data is maintained by CDFA.

California Department of Water Resources:

The California Department of Water Resources (DWR) conducts water quality monitoring at three sites on the lake ten times per year. This sampling started in the early 1970's. DWR conducted other sampling in Clear Lake in the 1960's. Currently DWR performs the following sampling:

Water Sample Collection

Lake water samples are collected with a Van Dom style 2.2 liter sampler and a 1.2 liter Teflon Kemmerer Bottle sampler to fill various High Density Polyethylene (HDPE) plastic bottles and ultra-clean glass bottles. Samples are taken at discrete layers in the water column every three meters (beginning at 0.5 meter and continuing at 3m, 6m, 9m... etc.). The Cache Creek surface water station sample is collected by dipping the collection bottle to 0.15 meters. Turbidity is measured in the field or the DWR Red Bluff lab from these same samples. Greater volumes are collected at 0.5 meters and at the bottom of lake stations for alkalinity, mineral, nutrient, and minor element analyses at either DWR's Bryte laboratory in Sacramento or an outside laboratory.

Mineral and some nutrient samples are filtered in the field with the use of a Geotech Peristaltic Sampling Pump and a 142mm stainless steel filtering head capable of supporting a 0.45 um nitrocellulose membrane filter. Dissolved minor element samples are filtered in a clean room at DWR's Bryte laboratory.

Lab analyses include:

Analyte	Frequency	Analyte	Frequency
Boron	10X / yr	Aluminum	4X / yr
Calcium	10X / yr	Arsenic	4X / yr

Magnesium	10X / yr	Cadmium	4X / yr
Potassium	10X / yr	Chromium	4X / yr
Sodium	10X / yr	Copper	4X / yr
Chloride	10X / yr	Iron	10X / yr
Nitrate	10X / yr	Lead	4X / yr
Sulfate	10X / yr	Manganese	4X / yr
Alkalinity	10X / yr	Nickel	4X / yr
Hardness	10X / yr	Selenium	4X / yr
Electrical conductivity	10X / yr	Silver	4X / yr
Total Dissolved Solids	10X / yr	Zinc	4X / yr
Ammonia Nitrogen, Total	10X / yr	Phytoplankton	10X / yr
Ammonia Nitrogen, Dissolved	10X / yr	Zooplankton	10X / yr
Total Kjeldahl Nitrogen	10X / yr		
Organic Nitrogen	10X / yr		
Ortho-phosphate	10X / yr		
Phosphorus	10X / yr		
Nitrite & Nitrate	10X / yr		

Temperature

All lake station temperatures are measured with a Hydrolab Surveyor 4a with H2O Multiprobe. As the probe descends, it is stopped every meter from surface to bottom, allowing for temperatures to stabilize, and then recorded. Surface water station (Cache Creek) temperatures are measured with an YSI Model 85 handheld oxygen, conductivity, and temperature system. The probe is submerged into the sample bottle, stirred, and temperatures are recorded at the station. A temperature recorder is located at the Cache Creek near Lower Lake station. The recorder (HOBO Water Temp. Pro) records temperature data every 15 minutes and is deployed year-round.

Dissolved Oxygen

Dissolved oxygen (D.O.) measurements are taken with the Hydrolab Surveyor 4a with H2O Multiprobe. Prior to collecting oxygen data, the Hydrolab is calibrated with YSI Model 85 handheld oxygen, conductivity, and temperature system. As the probe descends, it is stopped every meter from surface to bottom, allowing for temperatures to stabilize, and then recorded. D.O. is determined at tributary stations with the use of the YSI Model 85 handheld oxygen, conductivity, and temperature system. The probe is submerged into the sample bottle, stirred, and D.O. are recorded at the station

pH

All lake station pHs are measured with a Hydrolab Surveyor 4a with H2O Multiprobe. As the probe descends, it is stopped, every meter from surface to bottom, allowing for readings to stabilize, and then recorded. Tributary stations pHs are measured with a sensION1 portable pH meter. The probe is submerged into the sample bottle, stirred, that allowed to stabilize and pH is recorded at the station.

Specific Conductance

The specific conductance (SC) is measured with a Hydrolab Surveyor 4a with H2O Multiprobe. All lake stations are measured with a Hydrolab Surveyor4a with H2O Multiprobe. As the probe descends, it is stopped every meter from surface to bottom, allowing for readings to stabilize, and then recorded. SC is determined at tributary stations with the use of the YSI Model 85 handheld oxygen, conductivity, and temperature system. The probe is submerged into the sample bottle, stirred, allowed to stabilize and SC is recorded at the station.

Turbidity

Samples are taken at discrete layers in the water column every three meters (beginning at 0.5 meter and continuing at 3m, 6m, 9m... etc.) on lake stations in Y2 pint bottles. The Cache Creek sample is collected at a depth of 0.15 m with 1/2 pint bottles. An aliquot of each 1/2 pint is used for turbidity determination with a Hach Model 2100P Portable Turbidimeter. Sample water is gently mixed by turning the sample container over a few times, taking care not to create air bubbles. Water is then gently poured (again with no air bubbles) into a clean sample cell up to the line, the cell is capped and the sample cell is allowed to sit undisturbed for a few moments until any air bubbles that may have occurred have dissipated. The Hach Model 2100P Portable Turbidimeter is turned on and sample cell is placed with downward arrow towards line near front of meter and lid is closed. The READ button is pressed and the average turbidity is recorded in NTUS.

Transparency/Secchi

Transparency determination is made using a 20 centimeter Secchi disk with alternating black and white quadrants suspended on a non-stretch fiberglass tape measure. The disk is lowered from the shady side of the boat where the disappearance and reappearance are recorded and the average of the two depths is recorded.

Plankton Sampling

Methods for plankton include using either with a Van Dom style sampler which collects water samples at a specific depth, or plankton net which is lowered into the water column and towed in.

Phytoplankton grab samples are collected at 0.5 meters with subsequent samples collected every three meters (beginning at 3 meters) until reaching the bottom. Water is collected with a Van Dom style 2.2 liter bottle which collects samples at discrete depths in the water column. 50 ml -glass bottles are filled from the Van Dorn bottle, followed by the addition of 0.5-ml Lugol's solution as preservative, marked and stored for future identification.

Net sample (composites) are collected with a Wisconsin conical net and collection bucket being towed from bottom to surface, capturing- plankton from the entire water column at any given site. Zooplankton net and collection screen on bucket utilize a 63 um mesh. When the sampler reaches the surface the net is gently washed to assure all plankton is deposited in the collection bucket. The contents of the collection bucket are washed into a 2 oz. bottle, preserved with 0.5-imi of Lugol's solution, marked and stored for subsequent identification.

Data is maintained by DWR-Northern District. Some of the data is available on the internet.

Central Valley Regional Water Quality Control Board

Since April 2005, the Central Valley Regional Water Quality Control Board (CVRWQCB) has had chlorophyll-a samples collected on Clear Lake by DWR. Samples are collected throughout the water column at the three sample sites. This data provides some guidance on the TMDL, which sets a target level of no more than 73 ug/l of chlorophyll-a in Clear Lake as a level of compliance. In 2005 and 2007, there were 8 surface chlorophyll-a concentrations in excess of 73 ug/l.

Data is maintained by the CVRWQCB, with copies provided to the LCWPD.

Lake County Irrigated Agriculture Watershed Group

The Lake County Irrigated Agriculture Watershed Group (LCIAWG) conducts monitoring within the Clear Lake watershed at stream locations that are representative of agriculture in Lake County. The LCIAWG is a subgroup of the Sacramento Valley Water Quality Coalition (SVWQC). The LCIAWG monitors for toxicity, color, total dissolved solids, total suspended solids, turbidity, numerous metals nutrients, herbicides, basic water quality parameters, selected pesticides and coliforms. Monitoring is conducted several times per year as required by the Regional Board "Ag Waiver".

Data is maintained by the LCIAWG and the SVWQC. Data is submitted to the CVRWQCB as required by the Waiver.

Lake County Watershed Protection District

The Lake County Watershed Protection District (LCWPD) has performed the following sampling:

Lake Sediments

Lake sediments have been monitored since 1991 in an attempt to understand and quantify the internal nutrient (phosphorus) cycling within Clear Lake.

From August 1991 through June 1997, Ekman Dredge samples were collected monthly at 9 locations around the lake. The sediment was "fractionated" using extraction methods to determine the biologically available phosphorus (iron and aluminum bound phosphorus) and the total phosphorus. These analyses were performed at the Hopland Research and Extension Center, University of California. Following are the sampling sites:

Sampling Sites		
Site	Site Code	Lake Arm
Horseshoe Bend	HOS	Upper
Kelsey Creek Delta	KCR	Upper
Lower Arm East	LAE	Lower
Lower Arm West	LAW	Lower
The Narrows	NAR	Oaks
Rattlesnake Island	RATT	Oaks

Sampling Sites		
Site	Site Code	Lake Arm
Rodman Slough Delta	ROD	Upper
Soda Bay	SBY	Upper
Upper Arm	UA	Upper

Concurrent water samples were taken at the surface in these locations for ortho-phosphorus and total phosphorus. The initial data collected is discussed in Chapter 6 of the Clean Lakes Report (1994).

From March 1995 to June 1997, sediment cores were taken monthly near the center of the Upper Arm. These cores were also fractionated as described above. Initial cores were 12 centimeters (cm) in length, however, cores of 28 cm were collected starting in September 1995. An important finding from this monitoring is that the phosphorus cycling all occurs within the top 10 cm of the sediment.

Findings from the initial coring and the Ekman dredge samples are discussed in a paper presented by Dr. Peter Richerson, UC-Davis, at the 1997 Clear Lake Science and Management Symposium. The data from the cores matches the phosphorus cycling measured in the lake and was decreasing since the end of the drought (1992).

Since August 1997, sediment cores were collected ten times a year by the California Department of Water Resources (DWR) concurrent with their water quality monitoring program. All cores taken are 10 cm in length and are analyzed at depths of 0-1, 1-2, 2-3, 3-4, 4-6, 6-8 and 8-10 cm depths and fractionated as discussed above. Full analysis of this data has not been completed, however, a cursory data analysis completed in 2002 indicated there were no significant changes from the data reported on by Dr. Richerson in 1997.

Due to the retirement of the Chuck Vaughn, Hopland Research and Extension Center, University of California, and limited funds, this sediment sampling was discontinued, with the last samples collected in January 2008. The LCWPD is investigating restarting this sampling program with the University of California, Davis.

Tributary Water Quality

Monitoring of the Clear Lake tributaries began in 1992 to estimate the external (watershed) nutrient loading to Clear Lake for the Clean Lakes Report. Samples were collected at various flows in order to develop flow – constituent relationships. Constituents analyzed include total suspended solids, total solids, conductivity, temperature, pH, total phosphorus, and ortho-phosphorus. Some limited total nitrogen and total iron were also obtained. Most analyses were completed by LCWPD staff, however, total phosphorus, and presumably total iron and total nitrogen, were analyzed at the Hopland Research and Extension Center, University of California. Starting in 1992, samples were collected at numerous locations, however, many of the locations did not have flow data and were of limited use. Because of their limited usefulness, the ungaged sites were discontinued and monitoring continued at the three DWR stream gage locations on Kelsey, Scotts and Middle Creeks. This data was reported in the Upper Lake Management Area Watershed Analysis (1998) and the Clear Lake Basin

Monitoring and Implementation Plan
Clear Lake Mercury and Nutrient TMDL's
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Watershed Analysis (1999). Due to limited staffing, no samples have been collected since February 2000.

In 2005, the LCWPD received a grant for monitoring water quality for compliance with the Mercury TMDL for Clear Lake and the draft Nutrient TMDL for Clear Lake. The monitoring program has three goals, identify mercury hotspots within the Clear Lake watershed and determine the mercury and nutrient loading entering Clear Lake from the tributaries. Due to delays obtaining a signed Quality Assurance Project Plan and LCWPD staffing changes, monitoring did not begin in earnest until October 2006. The mercury hotspot monitoring is discussed under the Mercury TMDL.

Tributary monitoring of inflows was restarted at the three DWR stream gages. Analytes monitored at these sites include: total mercury, methyl mercury, iron, total dissolved solids, total suspended solids, sulphate, chloride, total phosphorus, nitrite, nitrate, ortho-phosphate, and total Kjeldahl nitrogen. Measurements were conducted in the field for electrical conductivity, temperature, pH and dissolved oxygen. Samples were collected in February 2007, December 2007, and January and February 2008. The two dry and short winters limited the ability to obtain many samples. A total of 46 samples were collected and analyzed. For loading determinations, these results were matched with flow data. Loading estimates for ortho-phosphate, phosphorus, suspended solids, iron, sulfate, chloride, total mercury and methyl mercury were developed for each of the stream gage locations. These loading estimates will be extrapolated to estimate the average annual loads to Clear Lake.

A Final Report on this monitoring program will be submitted to the CVRWQCB prior to March 2009. Funding to continue this monitoring program has not been identified.

Pesticide Data

The LCWPD collects data as part of the implementation of the Integrated Aquatic Plant Management Program (IAPMP). Data is collected by the applicators during the herbicide application period (generally June through September) at sites where herbicides are applied. Ten percent of the sites have follow-up monitoring to determine if pesticide remains in the water column. Constituents monitored include temperature, pH, dissolved oxygen, conductivity, secchi depth and herbicides. The data is maintained by the LCWPD.

Lake County Vector Control District:

Additional data is collected by the Lake County Vector Control District (LCVCD). A portion of the LCVCD data was entered into an Access database by interns working for the LCWPD in 2002. Data includes the following:

Water Quality, 4 sites, 1954-2002, monthly	
Air temperature	Water Temperature, top and bottom
pH, top and bottom	Water depth, m
Hardness, top and bottom	Turbidity, top and bottom
Secchi depth	
Vertical tow data, 3 sites, 1988-2002, monthly	
Phytoplankton	Zooplankton
Insect larvae	

Fish data (from beach seines), 11 sites, 1987-2001, several times per year (varies)	
Fish counts by species	
Chironomids, 8 sites, 1954-2002, monthly	
Count of numbers by family	
Chaoborids, 8 sites, 1954-2002, monthly	
Count of numbers by family	
Chaoborids, Chironomids, Hirudae, 13 sites, 1994-2002	
Count of numbers	

This is only a sampling of the data collected by LCVCD. Additional data may exist that may be of value. Data is maintained by the LCVCD.

Big Valley Rancheria

The Big Valley Rancheria monitors for water quality within and adjacent to Rancheria property. Sampling includes:

- Using a Hach Hydroprobe, we take water quality parameter measurements (DO, DO%, pH, Temp, Resistivity, TDS, Secchi Depths, Turbidity, Specific Conductivity) near Big Valley Rancheria and have been since 1999. Currently analyzing it for trends.
- Using a DMA Mercury Analyzer, we periodically analyze fish tissue, sediment and water for mercury concentrations and have been since 2005

Summary

As part of the limnological study discussed above, available data will be evaluated. If changes are recommended in the sampling protocols, additional sampling is determined to be necessary, and/or some sampling is determined not to be necessary for evaluation of Clear Lake's limnological condition, these changes in sampling will be reviewed by the CLTSC. Working through partnerships, efforts will be made to modify the numerous sampling programs to meet the needs of the individual agencies/organizations as well as to improve monitoring of Clear Lake and its watershed.

Effective collection of phosphorus loading information from the various sources:

As described above, the LCWPD has monitored sediment and phosphorus inflow to Clear Lake at the three DWR stream gage sites (Middle, Scotts and Kelsey Creeks) to calculate loading. These sites monitor approximately 35 percent of the watershed and surface water inflow to Clear Lake.

Refined estimates of loading would be available if more of the watershed could be monitored and gaged. The DWR Kelsey Creek gage monitors essentially the entire watershed's runoff. In the case of the Scotts and Middle Creek watersheds, appropriate downstream gage sites are not practical, due to lack of a control section, backwater conditions, or significant bypassing high flows. Additional gage sites could be constructed and maintained, however, stream gages on other creeks would not capture significantly more runoff. The next largest watershed contributing flow to Clear Lake is probably Adobe Creek, which is less than 5 % of the entire watershed. Therefore, the addition of another stream gage at approximately \$20,000 per year plus the water quality monitoring costs (easily in excess of \$20,000 per year per station) does not appear to be a practical alternative at this time.

Clear Lake's clarity does not appear to be directly affected by the previous year's nutrient load and internal phosphorus cycling is two to three times the average annual external phosphorus load.⁶ Expansion of the tributary water quality monitoring program should be postponed until after there is a better understanding the Clear Lake's limnology and its current conditions, as discussed previously.

Loading estimates have been developed at the DWR stream gages. The loading at these stream gages was extrapolated to the entire watershed, as was done during the development of the TMDL Target Report.

Funding for continued water quality monitoring at these gages has not been identified. The CLTSC will cooperate on identifying and obtaining funding for continued monitoring. The cities of Lakeport and Clearlake are exploring the possibility of conducting some limited sampling within the cities to determine approximate nutrient and sediment loadings.

Practices implemented or planned to control phosphorus loading to the lake:

Analysis of sedimentation rates from lake sediment cores⁷ has shown that sedimentation rates have changed significantly over time. Inorganic mass (IM) accumulation rates increased by up to a factor of 20 in 1927 (advent of large scale earthmoving equipment and open pit mining at the SBMM), and have decreased by a factor of 2 to 3 since 1954 (peak of DDD applications to Clear Lake). While this is still 4 to 10 times the pre-1927 rates, it does demonstrate that reduced delivery of eroded sediments to Clear Lake has occurred in the last 50-years. Insufficient detail is available to provide more refinement on sedimentation rates, however, improved construction practices in the last 20 years in Lake County have probably significantly decreased erosion and sediment delivery, including nutrients, to Clear Lake in the last 20 years. Reduced erosion in the watershed is probably a contributing factor to the lake's significantly improved clarity since 1992.

The Responsible Parties and other Stakeholders will continue to implement the practices and programs described in Existing Efforts of Stakeholders to reduce erosion and nutrient inputs to Clear Lake.

Additional practices and programs include:

- Implementation of the Middle Creek Flood Damage Reduction and Ecosystem Restoration Project as described on pages 9 and 10 of this document. This Project will significantly reduce the nutrient input to Clear Lake and restoration of the shallow, emergent wetland will help restore the natural balance to the limnology of Clear Lake.
- Restoration of 8 Mile Valley should be completed to reduce the erosion within the valley and to improve the valley's ability to trap sediment within the upper watershed as described on page 19 of this document.
- The WLRCD, in cooperation with the LCWPD, is developing watershed assessments for the Kelsey, Scotts and Middle Creek watersheds. The WLRCD and LCWPD are also developing the Clear Lake Integrated Watershed Management Plan (LCIWMP).

⁶ Richerson, et. al., The Causes and Control of Algal Blooms in Clear Lake, 1994

⁷ Richerson et. al., Anthropogenic Stressors and Changes in the Clear Lake Ecosystem as Recorded in Sediment Cores, Ecological Applications, in publication

- The LCWPD is coordinating an effort for stakeholders, including many members of the CLTSC, to develop a Lake County Integrated Regional Water Management Plan (LCIRWMP). The LCIRWMP is being developed to the guidelines of Proposition 50 and 84, and will include many different water management goals and strategies related to water supply, water quality, drainage, flood management, ecosystem function and recreation.

Develop criteria to determine when Clear Lake is no longer impaired:

Clear Lake is a naturally eutrophic lake. Studies of pollen contained within sediment cores by the United States Geological Survey have indicated Clear Lake has had limited clarity since the end of the last Ice Age, or approximately the last 10,000 years⁸. More recent cores collected and analyzed by University of California researchers suggest that the lake has always been eutrophic and that the lake's primary productivity has been dominated historically by nitrogen fixing cyanobacteria⁹. These cores show evidence of cultural eutrophication, however, there is little clarity on the extent of past changes in lake clarity.

This data is supported by historical accounts, such as Livingston Stone who wrote of his visit in 1872-1873¹⁰:

It is a singular fact, illustrating the inaptness with which names are often given to natural objects, that the water of Clear Lake is never clear. It is so cloudy, to use a mild word, that you cannot see three feet below the surface. The color of the water is a yellowish brown, varying indefinitely with the varying light. The water has an earthy taste, like swamp-water, and is suggestive of moss and water-plants. In fact, the bottom of the lake, except in deep places, is covered with a deep, dense moss, which sometimes rises to the surface, and often to such an extent in summer as to seriously obstruct the passage of boats through the water.

There are large soda springs boiling up at various points in the bed of the lake, which discharge into it vast quantities of soda-water daily. A reddish-brown, frothy substance is produced in such abundance by the natural evaporation of the soda-water that the lake in places seems to be full of it.

In winter, the water is cool and not disagreeable, in spite of its earthy taste; but, in summer, it grows warm, the swampy flavor becomes intensified, the frothy substance from the soda-water increases, the plants and moss from the bottom float in great quantities in the water, and it becomes unfit to drink.

These conditions would seem to be unfavorable to fish-life in the lake; but, by another of those numerous contradictions for which California is noted, this lake seems to be particularly adapted to fish, and the water teems with them.

This description describes floating algae (gleotrichea has a yellowish brown color, plus foam and floating "moss" could indicate blue-green algae mats) and aquatic macrophytes (dense

⁸ Adam, David P., "Pollen zonation and proposed informal climatic units for Clear Lake, California, cores CL-73-4 and CL-73-7, Late Quaternary Climate, Tectonism, and Sedimentation in Clear Lake, Northern California Coast Ranges, Geological Society of America Special Paper 214, 1988

⁹ Richerson et. al., Anthropogenic Stressors and Changes in the Clear Lake Ecosystem as Recorded in Sediment Cores, Ecological Applications, in publication

¹⁰ Stone, Livingston, Report of Operations in California in 1873. Propagation of Food Fishes, 2nd Session, 43rd Congress, 1874-75, Chapter XX, Pg 378-on

moss rising to the surface and obstructing boat passage may be aquatic plants, plus the reference to floating plants). These conditions have existed in Clear Lake since 1992, when lake clarity increased significantly.

These resources indicate that the pre- and early-European condition may be what many perceive as containing "...biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses." This raises the issue of whether Clear Lake ever met the Basin Plan narrative objective for nutrients during the most recent climate cycle.

As Clear Lake is naturally eutrophic, it cannot be expected to be oligotrophic, like a clear mountain lake, such as Lake Tahoe. Therefore, obtaining oligotrophic or mesotrophic conditions in Clear Lake are not a realistic goal for determining lake water quality impairment. Establishment of a goal for Clear Lake that is representative of its pre-European condition would be the most one could expect. At this time, it is unclear whether a pre-European condition can be quantified or whether numerical or narrative criteria, or a combination thereof, will be utilized for determining if Clear Lake is "impaired".

The CLTSC recommends the following strategy for determining when Clear Lake is no longer impaired:

- The limnology of Clear Lake must be better understood. The assessment of current limnological conditions and establishment of an obtainable lake condition must be completed as described on page 19.
- Determine, as data and information permits, the pre-European condition of Clear Lake to establish a baseline of Clear Lake's water quality (natural conditions).
- When causal relationships are determined, they should be evaluated to determine management and other actions necessary to improve lake water quality to meet the natural conditions determined above.
- When the above tasks have been completed, the Stakeholders should conduct a public process to evaluate the findings and establish criteria for determining when Clear Lake is no longer impaired for nutrients. Input from the scientific community and the public will be utilized in the process. The "impairment criteria" developed through this process will be presented to the CVRWQCB for consideration and incorporation into the Basin Plan.

Mercury TMDL

In 2005, the LCWPD received a grant for monitoring water quality for compliance with the Mercury TMDL for Clear Lake and the draft Nutrient TMDL for Clear Lake. The monitoring program has three goals, identify mercury hotspots within the Clear Lake watershed and determine the mercury and nutrient loading entering Clear Lake from the tributaries. Due to delays obtaining a signed Quality Assurance Project Plan and LCWPD staffing changes, monitoring did not begin in earnest until October 2006. Below is a summary of the hotspot monitoring program:

Mercury Hotspot Monitoring: This sampling program evolved based on discussions with personnel at the Central Valley Regional Water Quality Control Board since the original grant application and start of the monitoring program. Fine grained (fine sand and silt) sediments were collected from numerous locations within the Clear Lake watershed in October 2006 and analyzed for total mercury. Mercury analysis is being conducted by

Battelle Laboratories. High concentrations of mercury in the sediment would serve as an indicator for a "hotspot" upstream of the sampling site. In addition, eight sample sites were monitored within Clear Lake on the north side of Lucerne to determine if the abandoned "Utopia Mine" is a hotspot. From this initial sampling, no hotspots were identified in the watershed, with the exception of significantly elevated mercury levels offshore of the Utopia Mine. Elevated levels of total mercury were also detected in stream sediments in the Schindler, Burns Valley and Cole Creek watersheds.

Additional hotspot monitoring was conducted in the vicinity of the Utopia Mine. Total mercury levels upstream of the mine were determined to be normal background levels, a very small (< 1 sq. ft.) outcropping of enriched soil (140 ppm total Hg) was located along a probably geologic contact at the mine site, levels along Highway 20 were elevated but did not follow a pattern indicating mercury movement, and elevated mercury levels in lake sediments were limited to the immediate vicinity of the Utopia Mine. While not conclusive, it appears the mercury contamination is a legacy from the mining period and/or the highway construction.

Follow up hotspot sampling was conducted in the watersheds of Schindler, Burns and Cole Creeks. Some elevated levels of total mercury were observed, however, they were very localized and could not be traced either upstream or downstream. The hotspots appear to be localized and did not provide significant amounts of mercury to the ecosystem.

Tributary monitoring of inflows was restarted at the three DWR stream gages. Analytes monitored at these sites include: total mercury, methyl mercury, iron, total dissolved solids, total suspended solids, sulphate, chloride, total phosphorus, nitrite, nitrate, ortho-phosphate, and total Kjeldahl nitrogen. Measurements were conducted in the field for electrical conductivity, temperature, pH and dissolved oxygen. Samples were collected in February 2007, December 2007, and January 2008. The two dry and short winters limited the ability to obtain many samples. A total of 46 samples were collected and analyzed. For loading determinations, these results were matched with flow data. Based on these relationships, the average annual mercury loading was estimated at between 15.5 and 17.3 kg/yr. Mercury concentrations in the suspended sediments were determined to be lower than the mercury concentrations in lake sediments deposited prior to arrival of the Europeans, indicating the streams measured were at or below natural background mercury concentrations.

Based on the data collected during the monitoring program, no significant hotspots were identified and suspended sediment mercury concentrations were below background levels, therefore, the only practical reduction in mercury loading is through general erosion control. The stakeholders will continue to implement erosion control and riparian protection and restoration programs to reduce the amount of sediment and mercury delivery to Clear Lake. A Final Report on this monitoring program will be submitted to the CVRWQCB prior to March 2009.

The County and Cities will continue to implement the Stormwater Program, eliminating any illicit discharges and minimizing the discharge of mercury to the ecosystem.

APPENDIX A

RESOLUTION NO. R5-2002-0207 AMENDING THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO AND SAN JOAQUIN RIVER BASINS FOR THE CONTROL OF MERCURY IN CLEAR LAKE

crappie (total length 200-300 mm). The representative fish species for trophic level 3 shall be carp, hitch, Sacramento blackfish, black bullhead, and bluegill of all sizes; and brown bullhead and catfish of lengths less than the trophic level 4 lengths.

Fish tissue mercury concentrations are not expected to respond quickly to remediation activities at Sulphur Bank Mercury Mine, Clear Lake sediments, or the tributaries. Adult fish integrate methylmercury over a lifetime and load reduction efforts are not expected to be discernable for more than five years after remediation efforts. Therefore to assess remedial activities, part of the monitoring at Clear Lake will include indicator species, consisting of inland silversides and largemouth bass less than one year old, to be sampled every five years. Juveniles of these species will reflect recent exposure to methylmercury and can be indicators of mercury reduction efforts.

Average concentrations of methylmercury by trophic level should be determined in a combination of the identified species collected throughout Clear Lake. The number of fish collected to determine compliance with this objective will be based on the statistical variance within each species. The sample size will be determined by methods described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish or other statistical methods approved by the Executive Officer.

Total mercury in tributary sediment, lake sediment, and water will be monitored to determine whether loads have decreased. The water and sediment monitoring frequency will be every five years.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2002-0207

AMENDING THE WATER QUALITY CONTROL PLAN
FOR
THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS
FOR THE CONTROL OF MERCURY IN CLEAR LAKE

WHEREAS, in 1975 California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) adopted a Water Quality Control Plan (hereafter Basin Plan) for the Sacramento River and San Joaquin River Basins, which has been amended occasionally; and

WHEREAS, the Basin Plan may be amended in accordance with the California Water Code Section 13240, et seq.; and

WHEREAS, Water Code Section 13241 requires the Regional Board to establish water quality objectives and Section 13242 requires a program for implementation for achieving water quality objectives; and

WHEREAS, Clear Lake has been identified under the federal Clean Water Act Section 303(d) as an impaired waterbody due to elevated concentrations of methylmercury in fish tissue and the existence of a fish consumption advisory; and

WHEREAS, the Regional Board recognizes that the Basin Plan does not include numeric water quality objectives for mercury nor a plan to reduce mercury concentrations in Clear Lake therefore a Basin Plan amendment is required; and

WHEREAS, Regional Board staff have developed a water quality management strategy to reduce the concentrations of methylmercury in fish tissue that is based on reducing the overall mercury loads to Clear Lake; and

WHEREAS, the proposed amendment modifies Basin Plan Chapter II (Existing and Potential Beneficial Uses) to include commercial and sport fishing as a beneficial use designation for Clear Lake; and

WHEREAS, the proposed amendment modifies Basin Plan Chapter III (Water Quality Objectives) to establish a site-specific numeric objective for methylmercury in fish in Clear Lake; and

WHEREAS, the proposed amendment modifies Basin Plan Chapter IV (Implementation) to establish a water quality management strategy to reduce mercury loads into Clear Lake; and

RESOLUTION NO. R5-2002-0207
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FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS
FOR THE CONTROL OF MERCURY IN CLEAR LAKE

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WHEREAS, the proposed amendment modifies Basin Plan Chapter V (Surveillance and Monitoring) to include a water, sediment, and fish tissue monitoring program to monitor progress in achieving mercury concentration reductions; and

WHEREAS, the proposed amendment requires the U.S. Environmental Protection Agency to develop and implement a plan to reduce bioavailable mercury loads from the Sulfur Bank Mercury Mine and sediments of Clear Lake; and

WHEREAS, the proposed amendment requires federal, state, and local agencies to develop monitoring and implementation plans to reduce mercury loads from tributary waters to Clear Lake; and

WHEREAS, the Regional Board has considered the costs of implementing the proposed amendment, and finds these costs to be reasonable relative to the water quality benefits derived from implementing the proposed amendment; and

WHEREAS, Regional Board staff developed a report for public comment and peer review and held a public workshop on 22 May 2002, and the Regional Board considered an informational item on 6 June 2002 and held a public hearing on 6 September 2002 to consider the proposed amendment; and

WHEREAS, The basin planning process has been certified as "functionally equivalent" to the California Environmental Quality Act (CEQA) requirements for preparing environmental documents and is, therefore, exempt from those requirements (Public Resources Code, Section 21000 et seq.); and

WHEREAS, Regional Board staff has circulated a Notice of Public Hearing, Notice of Filing, a written staff report, an environmental checklist, and a draft proposed amendment to interested individuals and public agencies for review and comment in accordance with state and federal environmental regulations (23 CCR Section 3775, 40 CFR 25, and 40 CFR 131); and

WHEREAS, Regional Board staff completed an environmental checklist and functional equivalent document in compliance with the provisions of CEQA that concluded that the proposed amendment will have no potential for adverse effects, either individually or cumulatively, on wildlife or the environment; and

WHEREAS, a Basin Plan amendment must be approved by the State Water Resources Control Board, the Office of Administrative Law, and the U.S. Environmental Protection Agency before becoming effective; and

WHEREAS, the proposed amendment will not result in degradation of Clear Lake water quality with respect to water quality currently achieved or provided for in the water

RESOLUTION NO. R5-2002-0207
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FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS
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body and maintains the level of water quality necessary to protect existing and anticipated beneficial use; and

WHEREAS, the proposed amendment is consistent with the State Water Resources Control Board Resolution No. 68-16, in that the changes to water quality objectives (i) consider maximum benefits to the people of the state, (ii) will not unreasonably affect present and anticipated beneficial use of waters, and (iii) will not result in water quality less than that prescribed in policies. Likewise, the proposed amendment is consistent with the federal Antidegradation Policy (40 CFR 131.12); and

WHEREAS, this regulatory action meets the "Necessity" standard of the Administrative Procedures Act, Government Code, section 11353, subdivision (b):

THEREFORE BE IT RESOLVED, that the Regional Board certifies the staff report and environmental checklist as a functional equivalent document under CEQA for the Basin Plan; and be it further

RESOLVED, pursuant to sections 13240, et seq. of the California Water Code, the Regional Board, after considering the entire record, including oral testimony at the hearing, hereby approves the staff report and adopts an amendment to the Basin Plan to include commercial and sport fishing as a beneficial use, to establish a site-specific numeric water quality objective for methylmercury, and to establish a water quality management strategy to reduce mercury loads for Clear Lake as set forth in Attachment 1; and be it further

RESOLVED, that the Executive Officer is directed to forward copies of the Basin Plan amendment to the State Water Resources Control Board in accordance with the requirements of Section 13245 of the California Water Code; and be it further

RESOLVED, that the Regional Board requests that the State Water Resources Control Board approve the Basin Plan amendment in accordance with the requirements of Sections 13245 and 13246 of the California Water Code and forward it to the Office of Administrative Law and the U.S. Environmental Protection Agency; and be it further

RESOLVED, that, if during its approval process the State Water Resources Control Board, or Office of Administrative Law, or U.S. Environmental Protection Agency determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Regional Board of any such changes; and be it further

RESOLVED, the Executive Officer is authorized to sign a Certificate of Fee Exemption and following approval of the Basin Plan amendment by the U.S. Environmental Protection Agency submit this Certificate in lieu of payment of the Department of Fish and Game filing fee to the Secretary for Resources; and be it further

RESOLUTION NO. R5-2002-0207
AMENDING THE WATER QUALITY CONTROL PLAN
FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS
FOR THE CONTROL OF MERCURY IN CLEAR LAKE

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RESOLVED, following approval of the Basin Plan amendment by the U.S. Environmental Protection Agency, the Executive Officer shall file a Notice of Decision with the State Clearinghouse.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify that the forgoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 6 December 2002.

/s/

THOMAS R. PINKOS, Executive Officer

ATTACHMENT 1
RESOLUTION NO. R5-2002-0207
AMENDING THE WATER QUALITY CONTROL PLAN FOR
THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS FOR THE
CONTROL OF MERCURY IN CLEAR LAKE

Revise Chapter II (Existing and Potential Beneficial Uses), Table II-1 to add a footnote for Clear Lake:

Clear Lake (a)

Footnote: (a) Clear Lake: COMM

Revise Chapter III (Water Quality Objectives) to add:

Methylmercury

For Clear Lake (53), the methylmercury concentration in fish tissue shall not exceed 0.09 and 0.19 mg methylmercury/kg wet weight of tissue in trophic level 3 and 4 fish, respectively. Compliance with these objectives shall be determined by analysis of fish tissue as described in Chapter V, Surveillance and Monitoring.

Revise Chapter IV (Implementation) to add:

Mercury Discharges in the Sacramento River and San Joaquin River Basins

Mercury problems are evident region-wide. The main concern with mercury is that, like selenium, it bioaccumulates in aquatic systems to levels that are harmful to fish and their predators. Health advisories have been issued which recommend limiting consumption of fish taken from the Bay/Delta, Clear Lake, Lake Berryessa, Black Butte Reservoir, Lake Pillsbury, and Marsh Creek Reservoir. Concentrations of mercury in other water bodies approach or exceed National Academy of Science (NAS), U.S. Environmental Protection Agency (EPA), and/or U.S. Food and Drug Administration (FDA) guidelines for wildlife and human protection, respectively. In addition to these concerns, fish-eating birds taken from some bodies of water in the Basins have levels of mercury that can be expected to cause toxic effects. Bird-kills from mercury also have been documented in Lake Berryessa. (There is also concern for birds in the Delta, but no studies have been completed.) The Regional Water Board has done a preliminary assessment of the mercury situation in the Central Valley Region and concluded that the problem is serious and remedies will be complex and expensive.

The short-term strategy is to concentrate on correcting problems at upstream sites while monitoring the Delta to see whether upstream control activities measurably benefit the Delta. The Regional Water Board will support efforts to fund the detailed studies necessary to define assimilative capacity and to fully define uptake mechanisms in the biota.

~~An abatement study was completed for Clear Lake in 1990. The study identified abatement measures at Sulfur Bank Mine that are now being implemented as part of a USEPA~~

Attachment 1
Resolution No. R5-2002-0207
Amending the Water Quality Control Plan for the Sacramento River and
San Joaquin River Basins for the Control of Mercury in Clear Lake

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~~Superfund project.~~ In the next few years monitoring is scheduled to be done in the Delta and at upstream sources. The Regional Water Board will continue to support efforts to study how mercury is cycled through the Delta and to further characterize upstream sources.

Clear Lake Mercury

The Regional Water Board has a goal to reduce methylmercury concentrations in Clear Lake fish by reducing total mercury loads from various sources within the Clear Lake watershed.

Sources of mercury include past and present discharges from the Sulphur Bank Mercury Mine (SBMM) site, small mercury mines and geothermal sources, natural and anthropogenic erosion of soils with naturally occurring mercury, and atmospheric deposition. The goal of the Clear Lake mercury management strategy is to reduce fish tissue methylmercury concentrations by 60% of existing levels. This will be accomplished by reducing the concentration of total mercury in the surficial layer of lakebed sediment by 70% of existing levels and by further investigation and reduction of other mercury sources believed to have a high potential for mercury methylation. Through a complex process, total mercury is methylated and becomes bioavailable to organisms in the food web. The linkage between (1) the total mercury in the sediments derived from various sources and other sources of total mercury and (2) the concentration of methylmercury in ecological receptors, is complicated and subject to uncertainty. As additional information about these relationships becomes available, the Regional Water Board will revise and refine as appropriate the load allocation and implementation strategy to achieve fish tissue objectives.

Mercury Load Allocations

The strategy for meeting the fish tissue objectives is to reduce the inputs of mercury to the lake from tributaries and the SBMM site, combined with active and passive remediation of contaminated lake sediments. The load allocations for Clear Lake will result in a reduction in the overall mercury sediment concentration by 70% of existing concentrations. The load allocations are assigned to the active sediment layer of the lakebed, the SBMM terrestrial site, the tributary creeks and surface water runoff to Clear Lake, and atmospheric deposition. Table IV-5 summarizes the load allocations. The load allocation to the active sediment layer is expressed as reducing concentrations of total mercury in the active sediment layer to 30% of current concentrations. The load allocation to the SBMM terrestrial site is 5% of the ongoing loads from the terrestrial mine site. The load allocation for the mine also includes reducing mercury concentrations in surficial sediment to achieve the sediment compliance goals for Oaks Arm shown in Table IV-6. The load allocation to tributary and surface water runoff is 80% of existing loads. These load allocations account for seasonal variation in mercury loads, which vary with water flow and rainfall. The analysis includes an implicit margin of safety in the reference doses for methylmercury that were used to develop the fish tissue objectives. It also includes an explicit margin of safety of 10% to account for uncertainty in the relationship between fish tissue concentrations and loads of total mercury. The reductions in loads of total mercury from all sources are expected to result in attainment of water quality objectives.

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TABLE IV-5
MERCURY LOAD ALLOCATIONS

<u>Mercury Source</u>	<u>Allocation</u>
<u>Clear Lake</u>	<u>30% of existing</u>
<u>Sediment</u>	<u>concentration</u>
<u>Sulphur Bank</u>	<u>5% of existing load</u>
<u>Mine</u>	
<u>Tributaries</u>	<u>80% of existing load</u>
<u>Atmosphere</u>	<u>No change</u>

Sulphur Bank Mercury Mine

Reducing mercury concentrations in surficial sediment by 70% is an overall goal for the entire lake. To achieve water quality objectives, extremely high levels of mercury in the eastern end of Oaks Arm near SBMM must be reduced by more than 70%. To evaluate progress in lowering sediment concentrations, the following sediment compliance goals are established at sites that have been sampled previously.

TABLE IV-6
SEDIMENT COMPLIANCE GOALS FOR MERCURY IN CLEAR LAKE

<u>Site Designation</u>	<u>Location</u>	<u>Sediment Mercury Goal (a)</u> <u>(mg/kg dry weight)</u>
<u>Upper Arm</u>	<u>Center of Upper Arm</u>	<u>0.8</u>
<u>UA-03</u>	<u>on transect from</u> <u>Lakeport to Lucerne</u>	
<u>Lower Arm</u>	<u>Center of Lower Arm</u>	<u>1</u>
<u>LA-03</u>	<u>North and west of</u> <u>Monitor Point</u>	
<u>Oaks Arm</u>		
<u>OA-01 (c)</u>	<u>0.3 km from SBMM</u>	<u>16 (b)</u>
<u>OA-02 (c)</u>	<u>0.8 km from SBMM</u>	<u>16 (b)</u>
<u>OA-03 (c)</u>	<u>1.8 km from SBMM</u>	<u>16</u>
<u>OA-04 (c)</u>	<u>3 km from SBMM</u>	<u>10</u>
<u>Narrows 01</u>	<u>7.7 km from SBMM</u>	<u>3</u>

- (a) Sediment goals are 30% of existing concentrations. Existing concentrations are taken as the average mercury concentrations in samples collected in 1996-2000 (Clear Lake Basin Plan Amendment Staff Report).
- (a) (b) Due to the exceptionally high concentrations existing at the eastern end of Oaks Arm, sediment goals at OA-01 and OA-02 are not 70% of existing concentrations. These goals are equal to the sediment goal established for OA-03.
- (c) Sediment goal is part of the load allocation for SBMM.

Current and past releases from the Sulphur Bank Mercury Mine are a significant source of total mercury loading to Clear Lake. Ongoing annual loads from the terrestrial mine site to the lakebed sediments occur through groundwater, surface water, and atmospheric routes. Loads from ongoing releases from the terrestrial mine site should be

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reduced to 5% of existing inputs. Because of its high potential for methylation relative to mercury in lakebed sediments, mercury entering the lake through groundwater from the mine site should be reduced to 0.5 kg/year.

Past releases from the mine site are a current source of exposure through remobilization of mercury that exists in the lakebed sediments as a result of past releases to the lake from the terrestrial mine site. Past active mining operations, erosion and other mercury transport processes at SBMM have contaminated sediment in Oaks Arm. The load allocation assigned to SBMM includes reducing surficial sediment concentrations in Oaks Arm by 70% (more at sites nearest the mine site) to meet the sediment compliance goals in Table IV-6.

In 1990, the U.S. Environmental Protection Agency (USEPA) placed Sulphur Bank Mercury Mine on the National Priorities List under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The USEPA has already performed remediation actions to stabilize waste rock piles, reduce erosion, and control surface water on the site.

Estimates of the current annual loads from the terrestrial mine site to the surficial lakebed sediment are under investigation. Existing data indicate that loads of total mercury from the terrestrial mine site are within a broad range of 1 to 568 kg mercury per year. New data may be used to refine the load estimates as discussed below. As part of verifying compliance with the load allocations, remediation activities to address current and past releases from SBMM should be conducted to meet the sediment compliance goals listed in Table IV-6 for sediments within one kilometer of the mine site, specifically at sites OA-01 and OA-02.

The Regional Water Board anticipates that fish tissue objectives for mercury will not be met unless the load reductions from Sulphur Bank Mercury Mine are attained. The Regional Water Board will request that USEPA continue remediation activities on the mine site and prepare an implementation plan or plans that address the following: reduction of ongoing releases of mercury from the SBMM site through surface water, groundwater, and the atmosphere; necessary remediation for mercury in lakebed sediments previously deposited through mining, erosion, and other processes at the mine site; and monitoring and review activities. The implementation plans should provide interim sediment goals and explain how control actions will assist in achieving fish tissue objectives for mercury in Clear Lake. The Regional Water Board will request that USEPA submit remediation plans for Regional Board approval for the SBMM site within eight years after the effective date of this amendment and implement the plan two years thereafter. USEPA should complete remediation activities at the mine site and active lakebed sediment remediation within ten years of plan implementation.

USEPA anticipates implementing additional actions to address the ongoing surface and groundwater releases from the SBMM over the next several years. These actions are expected to lead to significant reductions in the ongoing releases from the mine pit, the mine waste piles and other ongoing sources of mercury releases from the terrestrial mine site. USEPA also currently plans to investigate what steps are appropriate under CERCLA to address the existing contamination in the lakebed sediments due to past releases from the SBMM. Regional Water Board staff will continue to work closely with the USEPA on these important activities. In addition, Regional Water Board staff will coordinate monitoring

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activities to investigate other sources of mercury loads to Clear Lake. These investigations by USEPA and the Regional Water Board should reduce the uncertainty that currently exists regarding the annual load of total mercury to the lake, the contribution of each source to that load, and the degree to which those sources lead to methylmercury exposure to and mercury uptake by fish in the lake. This information should lead to more refined decisions about what additional steps are appropriate and feasible to achieve the applicable water quality criteria.

The sediment compliance goals for Oaks Arm will require USEPA to address both (1) the ongoing releases from the terrestrial mine site and (2) the load of total mercury that currently exists in the active lakebed sediment layer as a result of past releases. Potential options to control the ongoing releases of mercury from the terrestrial mine site include: remediation of onsite waste rock, tailings and ore piles to minimize the erosion of mercury contaminated sediments into the lake; diversion of surface water run-on away from waste piles and the inactive mine pit; control and containment or treatment of surface water runoff; control of groundwater flow into Clear Lake; and reduction of mercury flux from the mine waste piles into the atmosphere.

Meeting the load allocation for the lakebed sediment will require remediation of contaminated sediment. Potential options to address the mercury that currently exists in the lakebed as a result of past releases and is being remobilized may include dredging the contaminated sediment, capping with clean sediments, facilitating natural burial of highly contaminated sediments, or reducing the transport of highly contaminated sediments from the Oaks Arm into the rest of the lake. Monitoring to assess progress toward meeting the load reduction goals from Sulphur Bank Mercury Mine should be planned and conducted as part of specific remediation activities. Baselines for mercury loads from the various ongoing inputs from the mine site should be established in order to evaluate successes of the remediation activities.

In order to refine the load estimates from SBMM, the Regional Water Board recommends that USEPA determine the following information: mercury concentrations and sediment deposition rates for sediment cores collected near the mine site; characterization of porewater in sediments near the mine site to determine sources, magnitude and impacts of mercury-containing fluids/groundwater entering the lake; estimates of total surface water and groundwater fluxes of mercury from SBMM, including transport through the wetlands north of the site; and patterns of sediment transport and deposition within the lake.

If additional information reveals that reaching the 95% reduction in mercury loads from the terrestrial mine site is technically infeasible or cost prohibitive, or otherwise not technically justified, the Regional Water Board will consider internal adjustments to the SBMM load allocation. It may be possible to adjust the allocation among the terrestrial site and the contaminated sediments associated with the SBMM, provided the internal reallocation achieves the same overall reduction in loads from mine-related sources (terrestrial mine site and ongoing contributions from highly contaminated sediments). Any internal adjustment must achieve the sediment compliance goals in the east end of Oaks Arm.

Although USEPA is currently spending public funds to address the releases from the SBMM, the owner of SBMM is the party that is legally responsible for addressing the past, current and future releases from the SBMM and for developing implementation plans, implementing

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control activities that result in achievement of the load reduction, and performing monitoring to verify the load reduction.

Tributaries and Surface Water Runoff

Past and current loads of total mercury from the tributaries and direct surface water runoff are also a source of mercury loading to the lake and to the active sediment layer in the lakebed. This section excludes loads from surface water runoff associated with the SBMM because those are addressed separately above. The loads of total mercury from the tributaries and surface water runoff to Clear Lake should be reduced by 20% of existing levels. In an average water year, existing loads are estimated to be 18 kg/year. Loads range from 1 to 60 kg/year, depending upon water flow rates and other factors. The load allocation applies to tributary inputs as a whole, instead of to individual tributaries. Efforts should be focused on identifying and controlling inputs from hot spots. The U.S. Bureau of Land Management, U.S. Forest Service, other land management agencies in the Clear Lake Basin, and Lake County shall submit plans for monitoring and implementation to achieve the necessary load reductions. The Regional Water Board will coordinate with the above named agencies and other interested parties to develop the monitoring and implementation plans. The purpose of the monitoring shall be to refine load estimates and identify potential hot spots of mercury loading from tributaries or direct surface runoff into Clear Lake. Hot spots may include erosion of soils with concentrations of mercury above the average for the rest of the tributary. If significant sources are identified, the Regional Water Board will coordinate with the agencies to develop and implement load reductions. The implementation plans shall include a summation of existing erosion control efforts and a discussion of feasibility and proposed actions to control loads from identified hot spots. The agencies will provide monitoring and implementation plans within five years after the effective date of this amendment and implement load reduction plans within five years thereafter. The goal is to complete the load reductions within ten years of implementation plan approval.

Regional Water Board staff will work with the Native American Tribes in the Clear Lake watershed on mercury reduction programs for the tributaries and surface water runoff. Staff will solicit the Tribe's participation in the development of monitoring and implementation plans.

Wetlands

The Regional Water Board is concerned about the potential for wetland areas to be significant sources of methylmercury. Loads and fate of methylmercury from wetlands that drain to Clear Lake are not fully understood. The potential for production of methylmercury should be assessed during the planning of any wetlands or floodplain restoration projects within the Clear Lake watershed. The Regional Water Board establishes a goal of no significant increases of methylmercury to Clear Lake resulting from such activities. As factors contributing to mercury methylation are better understood, the possible control of existing methylmercury production within tributary watersheds should be examined.

Atmospheric Deposition

Atmospheric loads of mercury originating outside of the Clear Lake watershed and depositing locally are minimal. Global and regional atmospheric inputs of mercury are not under the jurisdiction of the Regional Water Board. Loads of mercury from outside of the Clear Lake

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watershed and depositing from air onto the lake surface are established at the existing input rate, which is estimated to be 1 to 2 kg/year.

Public Education

An important component of the Clear Lake mercury strategy is public education. Until the effects of all mercury reduction efforts are reflected in fish tissue levels, the public needs to be continually informed about safe fish consumption levels. The Lake County Public Health Department will provide outreach and education to the community, emphasizing portions of the population that are at risk, such as pregnant women and children. Education efforts may include recommendations to eat smaller fish and species having lower mercury concentrations.

Monitoring and Review

The monitoring plan for Clear Lake will determine whether mercury loads have been reduced to meet sediment compliance goals and fish tissue objectives. Monitoring will include fish tissue, water and sediment sampling. The Regional Water Board will oversee the preparation of detailed monitoring plans and resources to conduct monitoring of sediment, water and fish to assess progress toward meeting the water quality objectives. Chapter V, Surveillance and Monitoring, provides details for monitoring in Clear Lake.

The Regional Water Board will review the progress toward meeting the fish tissue objectives for Clear Lake every five years. The review will be timed to coincide with the five-year review to be conducted by USEPA for the Record of Decision for the Sulphur Bank Mercury Mine Superfund Site. The Clear Lake mercury management strategy was developed with existing information. The Regional Water Board recognizes that there are uncertainties with the load estimates and the correlation between reductions in loads of total mercury, methylmercury uptake by biota, and fish tissue concentrations. Regional Water Board staff will consider any new data to refine load estimates and allocations from sources within the Clear Lake watershed. Estimates of existing loads from SBMM or the tributaries will be refined during the review process. If new data indicate that the linkage analysis or load allocations will not result in attainment of the fish tissue objectives, or the fish tissue objectives or load allocations require adjustment, revisions to the Basin Plan will be proposed.

Revise Chapter IV (Surveillance and Monitoring) to add:

Clear Lake Methylmercury

The Regional Water Board will use the following criteria to determine compliance with the methylmercury fish tissue objectives in Clear Lake. Mercury will be measured in fish of the species and sizes consumed by humans and wildlife. The objectives are based on the average of methylmercury concentrations in muscle tissue of trophic level 3 and 4 fish. Because greater than 85% of total mercury in muscle tissue of fish of these sizes is methylmercury, analysis of muscle tissue for total mercury is acceptable for assessing compliance.

Fish from the following species will be collected and analyzed every ten years. The representative fish species for trophic level 4 shall be largemouth bass (total length 300-400 mm), catfish (total length 300 – 400 mm), brown bullhead (total length 300-400 mm), and

APPENDIX B

RESOLUTION NO. R5-2006-0060 AMENDMENT TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO AND SAN JOAQUIN RIVER BASINS FOR THE CONTROL OF NUTRIENTS IN CLEAR LAKE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2006-0060

AMENDMENT TO THE WATER QUALITY CONTROL PLAN
FOR
THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS
FOR
THE CONTROL OF NUTRIENTS IN CLEAR LAKE

WHEREAS, the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) finds that:

1. In 1975 the Central Valley Water Board adopted the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan), which has been amended occasionally.
2. The Basin Plan may be amended in accordance with the California Water Code Section 13240, et seq.
3. Water Code section 13242 sets forth the requirements for a program for implementation for achieving water quality objectives.
4. Clear Lake is listed on the federal Clean Water Act section 303(d) list as impaired due to nuisance algae blooms.
5. The Central Valley Water Board recognizes that the Basin Plan does not include a plan to control nutrients in Clear Lake; therefore, a Basin Plan amendment is appropriate.
6. The regulatory action proposed meets the "Necessity" standard of the Administrative Procedures Act, Government Code, section 11353, subdivision (b).
7. The Central Valley Water Board has prepared draft amendments, which establish a framework for further study and a phosphorus control program for Clear Lake.
8. The proposed amendments will revise Chapter IV (Implementation) and Chapter V (Surveillance and Monitoring) of the Basin Plan.
9. The basin planning process has been certified as "functionally equivalent" to the California Environmental Quality Act requirements for preparing environmental documents as specified in Title 23 California Code of Regulations (23 CCR) Section 3782 and is, therefore, exempt from those requirements (Public Resources Code, Section 21000 et seq.).

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AMENDMENT TO THE BASIN PLAN
FOR THE CONTROL OF NUTRIENTS IN CLEAR LAKE

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10. The Central Valley Water Board staff held a scoping meeting on 5 May 2005 and the Central Valley Water Board held a public workshop on 5 May 2006 to receive comments on the draft amendment and to identify any significant issues that must be considered.
11. Central Valley Water Board staff developed a draft staff report and draft Basin Plan Amendment for external scientific peer review in November 2005 in accordance with Health and Safety Code Section 57004 and the draft final staff report and amendment have been changed to conform to the recommendations of the peer reviewers or staff has provided an explanation of why no change was made.
12. The Central Valley Water Board finds that the scientific portions of the Basin Plan Amendment are based on sound scientific knowledge, methods, and practices in accordance with Health and Safety Code Section 57004.
13. Central Valley Water Board staff has prepared a draft amendment and a staff report dated May 2006.
14. Central Valley Water Board staff completed an environmental checklist and the Water Board has concluded that the proposed amendment results in no potential for adverse effect, either individually or cumulatively, on wildlife.
15. The draft amendment, staff report, and environmental checklist have been noticed and circulated to interested individuals and public agencies for review and comment in accordance with state and federal environmental regulations (23 CCR Section 3775, 40 CFR 25, and 40 CFR 131).
16. The Central Valley Water Board held a public hearing on 23 June 2006, for the purpose of receiving testimony on the draft Basin Plan amendment. Notice of the public hearing was sent to all interested persons and published in accordance with California Water Code, section 13244.
17. The Central Valley Water Board has considered the factors set forth in Water Code section 13241, including economic considerations, in developing this proposed amendment.
18. A Basin Plan amendment must be approved by the State Water Board, Office of Administrative Law (OAL), and USEPA before becoming effective.
19. The Central Valley Water Board finds that the amendment to the Basin Plan was developed in accordance with California Water Code Section 13240, et seq.

THEREFORE BE IT RESOLVED:

1. Pursuant to Section 13240, et seq. of the California Water Code, the Central Valley Water Board, after considering the entire record, including oral testimony at the hearing,

RESOLUTION NO. 5-2006-0060
AMENDMENT TO THE BASIN PLAN
FOR THE CONTROL OF NUTRIENTS IN CLEAR LAKE

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hereby approves the staff report and adopts the amendment to the Basin Plan as set forth in Attachment 1.

2. The Executive Officer is directed to forward copies of the Basin Plan amendment to the State Water Board in accordance with the requirements of Section 13245 of the California Water Code.
3. The Central Valley Water Board requests that the State Water Board approve the Basin Plan amendment in accordance with the requirements of Sections 13245 and 13246 of the California Water Code and forward it to OAL and the USEPA.
4. If during its approval process the Central Valley Water Board staff, State Water Board or OAL determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Central Valley Water Board of any such changes.
5. The Central Valley Water Board concurs with staff's conclusion that the proposed amendment will have no potential for adverse effects, either individually or cumulatively, on wildlife or the environment and the Executive Officer is authorized to sign a Certificate of Fee Exemption and following approval of the Basin Plan amendment by the OAL submit this Certificate in lieu of payment of the Department of Fish and Game filing fee to the Secretary for Resources.
6. The environmental documents prepared by Central Valley Water Board staff pursuant to Public Resources Code Section 21080.5 are hereby certified and, following approval of the Basin Plan amendment by the OAL, the Executive Officer shall file a Notice of Decision with the State Clearinghouse.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 23 June 2006.

PAMELA C. CREEDON, Executive Officer

ATTACHMENT 1
RESOLUTION NO. R5-2006-0060
AMENDMENT TO BASIN PLAN
FOR
THE CONTROL OF NUTRIENTS IN CLEAR LAKE

Revise Basin Plan sections as follows:

CHAPTER IV: IMPLEMENTATION

Central Valley Water Board staff proposes the following language be added after the new subheading **Clear Lake Nutrients**.

Nuisance algae blooms impair beneficial uses in Clear Lake, which is a violation of the narrative basin plan objective that states "water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses"

Research and studies have concluded that there are likely multiple factors that influence the occurrence of nuisance algae blooms in Clear Lake. Recent improvements in water clarity may be due to a reduction in phosphorus loading or a result of other factors such as iron or sulfur availability, changes to lake ecology (introduced species, etc.), water year type or a combination of factors. For the purposes of this program of implementation both phosphorus loading and other factors that may affect algae growth will be addressed.

1. Modeling studies predict that a 40% reduction in average phosphorus loading will significantly reduce the incidence of algae blooms. A 40% reduction would equal an annual allowable loading of approximately 87,100 kg. Therefore, for this program of implementation, an average annual (five year rolling average) phosphorus load of 87,100 kg is established as the loading capacity for Clear Lake.
2. Waste load allocations for the NPDES facilities discharging to the lake or tributaries are as follows:
 - a. Lake County Stormwater Permittees (Lake County, City of Clearlake, City of Lakeport) - 2,000 kg/yr
 - b. California Department of Transportation (Caltrans) – 100 kg/yr
3. The load allocation for nonpoint source dischargers is 85,000 kg/yr average annual load (five year rolling average). The U.S. Bureau of Land Management (USBLM), U.S. Forest Service (USFS), Lake County (County) and irrigated agriculture are responsible for controlling

phosphorus discharges from those portions of the watershed within their respective authority.

4. Regional Water Board staff will work with the responsible parties – Stormwater permittees, Caltrans, USBLM, USFS, County and irrigated agriculture – to develop and implement a plan to collect the information needed to determine what factors are important in controlling nuisance blooms and to recommend what control strategy should be implemented. The responsible parties will submit the plan to the Regional Water Board by [one year after approval by OAL]. The plan should address the following topics:
 - Studies to assess the current limnological conditions and to determine the appropriate measures necessary for Clear Lake to meet the Basin Plan objectives
 - Appropriate monitoring for evaluating conditions in the lake
 - Effective collection of phosphorus loading information from the various sources
 - Practices implemented or planned to control phosphorus loading to the lake
 - Develop criteria to determine when Clear Lake is no longer impaired
5. Compliance with load and waste load allocations for phosphorus in Clear Lake is required by [ten years after approval by OAL]. However, by [five years and three months after approval by OAL], the Regional Board will consider information developed and determine whether the phosphorus load and waste load allocations should continue to be required or if some other control strategy or approach is more appropriate. To the extent that other controllable water quality factors, besides phosphorus, cause or contribute to nuisance algae blooms, those factors will be addressed in revisions to this program of implementation. Implementation of phosphorus control practices to achieve load and waste load allocations will occur under waste discharge requirements or waivers of waste discharge requirements.
6. If Clear Lake is attaining its beneficial uses and the Regional Water Board determine that phosphorus loads above allocated amounts are not causing or contributing to nuisance algae problems, the Regional Water Board will amend the Basin Plan to revise this nutrient control program for Clear Lake.

The proposed modification adds a new subheading under “Estimated Costs of Agricultural Water Quality Control Programs and Potential Sources of Financing” labeled **Clear Lake Nutrient Control Program**.

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Estimated costs to implement BMPs, if necessary, are \$400,000 to \$1,800,000 (2006 dollars).

Potential funding sources include:

1. Those identified in the San Joaquin River Subsurface Agricultural Drainage Control Program and the Pesticide Control Program.

CHAPTER V: SURVEILLANCE AND MONITORING

Regional Water Board staff proposes to add a new heading in Chapter V entitled **Clear Lake Nutrients**, which will include the following language.

The responsible parties – Lake County, City of Clearlake, City of Lakeport, Caltrans, USBLM, USFS and irrigated agriculture – will work with Regional Water Board staff to estimate nutrient loadings from activities in the watershed. Loading estimates can be conducted using either water quality monitoring or computer modeling or a combination of the two.

ATTACHMENT 1
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AMENDMENT TO BASIN PLAN
FOR
THE CONTROL OF NUTRIENTS IN CLEAR LAKE

Revise Basin Plan sections as follows:

CHAPTER IV: IMPLEMENTATION

Central Valley Water Board staff proposes the following language be added after the new subheading **Clear Lake Nutrients**.

Nuisance algae blooms impair beneficial uses in Clear Lake, which is a violation of the narrative basin plan objective that states "water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses"

Research and studies have concluded that there are likely multiple factors that influence the occurrence of nuisance algae blooms in Clear Lake. Recent improvements in water clarity may be due to a reduction in phosphorus loading or a result of other factors such as iron or sulfur availability, changes to lake ecology (introduced species, etc.), water year type or a combination of factors. For the purposes of this program of implementation both phosphorus loading and other factors that may affect algae growth will be addressed.

1. Modeling studies predict that a 40% reduction in average phosphorus loading will significantly reduce the incidence of algae blooms. A 40% reduction would equal an annual allowable loading of approximately 87,100 kg. Therefore, for this program of implementation, an average annual (five year rolling average) phosphorus load of 87,100 kg is established as the loading capacity for Clear Lake.
2. Waste load allocations for the NPDES facilities discharging to the lake or tributaries are as follows:
 - a. Lake County Stormwater Permittees (Lake County, City of Clearlake, City of Lakeport) - 2,000 kg/yr
 - b. California Department of Transportation (Caltrans) – 100 kg/yr
3. The load allocation for nonpoint source dischargers is 85,000 kg/yr average annual load (five year rolling average). The U.S. Bureau of Land Management (USBLM), U.S. Forest Service (USFS), Lake County (County) and irrigated agriculture are responsible for controlling

phosphorus discharges from those portions of the watershed within their respective authority.

4. Regional Water Board staff will work with the responsible parties – Stormwater permittees, Caltrans, USBLM, USFS, County and irrigated agriculture – to develop and implement a plan to collect the information needed to determine what factors are important in controlling nuisance blooms and to recommend what control strategy should be implemented. The responsible parties will submit the plan to the Regional Water Board by [one year after approval by OAL]. The plan should address the following topics:
 - Studies to assess the current limnological conditions and to determine the appropriate measures necessary for Clear Lake to meet the Basin Plan objectives
 - Appropriate monitoring for evaluating conditions in the lake
 - Effective collection of phosphorus loading information from the various sources
 - Practices implemented or planned to control phosphorus loading to the lake
 - Develop criteria to determine when Clear Lake is no longer impaired
5. Compliance with load and waste load allocations for phosphorus in Clear Lake is required by [ten years after approval by OAL]. However, by [five years and three months after approval by OAL], the Regional Board will consider information developed and determine whether the phosphorus load and waste load allocations should continue to be required or if some other control strategy or approach is more appropriate. To the extent that other controllable water quality factors, besides phosphorus, cause or contribute to nuisance algae blooms, those factors will be addressed in revisions to this program of implementation. Implementation of phosphorus control practices to achieve load and waste load allocations will occur under waste discharge requirements or waivers of waste discharge requirements.
6. If Clear Lake is attaining its beneficial uses and the Regional Water Board determine that phosphorus loads above allocated amounts are not causing or contributing to nuisance algae problems, the Regional Water Board will amend the Basin Plan to revise this nutrient control program for Clear Lake.

The proposed modification adds a new subheading under “Estimated Costs of Agricultural Water Quality Control Programs and Potential Sources of Financing” labeled **Clear Lake Nutrient Control Program**.

APPENDIX C

MEMORANDUM OF UNDERSTANDING FOR THE IMPLEMENTATION OF THE MERCURY AND NUTRIENT TMDL'S FOR CLEAR LAKE

CLEAR LAKE TMDL STAKEHOLDER COMMITTEE

Memorandum of Understanding
Clear Lake TMDL Stakeholder Committee
Page 4

- H. New parties may be added to this MOU by their submitting a signature sheet with a statement of agreed duties and goals.
- I. All books, papers, or documents related to this MOU shall be available for examination by the public and by officials having oversight authority in any of the organizations signing this MOU.
- J. All parties will meet for the purpose of developing, documenting, and implementing Plan to control mercury and nutrient loading of Clear Lake. The Stakeholder Committee shall be governed by a Steering Committee consisting of the Responsible Parties. The Lake County Deputy Director Public Works, Water Resources, will act as chairman of the Steering Committee and one of the Responsible Parties acting as co-chair.
- K. Each party shall perform its responsibilities and activities described herein as an independent contractor and not as an officer agent, servant, or employee of any of the other parties hereto. Each party shall be solely responsible for the acts and omissions of its officers, agents, employees, volunteers, contractors, and subcontractors, if any. Nothing herein shall be considered as creating a partnership or joint venture between the parties.
- L. This MOU shall become effective upon execution by a minimum of two (2) of Responsible Parties. Unless terminated by written notice, this MOU shall remain in force until the water quality objectives in the Basin Plan have been met.
- M. The parties acknowledge this MOU is not a legally binding contract.
- N. Any information furnished to the Federal Agencies under this MOU is subject to the Freedom of Information Act (5 U.S.C. 552).

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MEMORANDUM OF UNDERSTANDING
FOR THE
IMPLEMENTATION OF THE MERCURY AND NUTRIENT
TMDL'S FOR CLEAR LAKE

CLEAR LAKE TMDL STAKEHOLDER COMMITTEE

I. Authority

This Memorandum of Understanding (MOU) is entered into to establish a Stakeholder Committee to address the Mercury TMDL for Clear Lake and the Nutrient TMDL for Clear Lake.

On December 6, 2002, the California Regional Water Quality Control Board, Central Valley Region adopted Resolution No. R5-2002-0207, Amending the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Mercury in Clear Lake. The Environmental Protection Agency, County of Lake, City of Lakeport, City of Clearlake, United States Bureau of Land Management, and the United States Forest Service have been named as Responsible Parties and have received Load Allocations under the TMDL and will be required to submit a monitoring and implementation plan to the Regional Water Board for the control of mercury in Clear Lake.

On June 23, 2006, the California Regional Water Quality Control Board, Central Valley Region adopted Resolution No. R5-2006-0060 an Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Nutrients in Clear Lake. The County of Lake, City of Lakeport, City of Clearlake, California Department of Transportation, United States Bureau of Land Management, United States Forest Service, and irrigated agriculture have been named as Responsible Parties and have received Waste Load Allocations, and will be required to submit plan(s) to the Regional Water Board for the control of nutrients in Clear Lake.

The Stakeholder Committee for the control of mercury and nutrients in Clear Lake is open to any organization or individual desiring to provide monitoring data and input to the implementation of the TMDL's.

II. Purpose

The purpose of this MOU is to establish a Stakeholder Committee within the boundaries of Upper Cache Creek Watershed (UCCW) to be known as the Clear Lake TMDL Stakeholder Committee (CLTSC) and to define the terms and conditions under which the CLTSC will cooperate, coordinate activities and provide the necessary expertise and input to assist with the implementation of the Mercury TMDL for Clear Lake and the Nutrient TMDL for Clear Lake.

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Clear Lake TMDL Stakeholder Committee
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III. Goals

All parties have a mutual interest in controlling mercury and nutrients entering Clear Lake, meeting water quality objectives and share the following goals:

- A. Control: Combine resources to achieve required mercury and nutrient load reductions and to eliminate the impairment of the beneficial uses of Clear Lake.
- B. Information Exchange: Share information regarding best management practices, monitoring data and methods.
- C. Cooperation:
 - 1. Develop and implement a Plan to reduce the input of mercury and reduce the mercury concentrations in the lake sediments.
 - 2. Develop and implement a Plan to collect the information needed to determine what factors are important in controlling nuisance algae blooms and to recommend what control strategy should be implemented.

IV. Agreement

It is mutually agreed upon and understood by and between the parties that each party will coordinate their respective actions to perform the activities as follows:

A. Responsible Parties – Mercury:

- 1. The County of Lake, City of Lakeport, City of Clearlake, United States Bureau of Land Management, and the United States Forest Service agree to mutually develop a Plan for monitoring and implementation to reduce mercury inputs to Clear Lake no later than October 2008.

B. Responsible Parties – Nutrients:

- 1. The County of Lake, City of Lakeport, City of Clearlake, California Department of Transportation, United States Bureau of Land Management, United States Forest Service, and irrigated agriculture agree to mutually develop a Plan no later than October 2008 for submittal to the Regional Board which includes the following:
 - a. Identify studies to assess current limnological conditions and to determine the appropriate measures to meet the Basin Plan objectives
 - b. Develop appropriate monitoring for evaluating conditions in the lake
 - c. Devise methods to effectively collect phosphorus loading information from various sources

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- d. Identify practices currently implemented or planned to control phosphorus loading to the lake
- e. Development of criteria to determine when Clear Lake is no longer impaired
2. Cooperate in the development of grant proposals to fund the implementation of the Plan.
3. Cooperate in the submittal of reports to the Central Valley Regional Water Quality Control Board
4. Cooperate in the implementation of Best Management Practices

C. Other Stakeholders:

1. Participate with the Responsible Parties in the execution of the activities described in Sections IV.A and B to implement the TMDL's.
 2. Cooperatively provide pertinent data and monitoring methods for the implementation of the TMDL's.
 3. Cooperate in the development of grant proposals or other funding sources to implement the TMDL's programs and activities
 4. Cooperate in the implementation of Best Management Practices
- D. This instrument is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this instrument will be handled in separate agreements developed in accordance with applicable laws, regulations, and procedures including those for Government procurement and printing. Such endeavors will be outlined in separate written agreements, signed by authorized representatives of those participating parties. This instrument does not provide such authority. Specifically, this instrument does not establish the authority for noncompetitive award to any party to this MOU or to any other participant in developing the implementation Plan. Any contract or agreement for training or other services must fully comply with all applicable requirements for competition.
- E. This MOU may be revised as necessary, by mutual consent of the parties, by issuance of a written amendment signed and dated by all parties. As a minimum, the MOU shall be reviewed upon the revision/reissuance of the mercury or nutrient TMDL's for Clear Lake by the State of California.
- F. This MOU in no way restricts any party from participating in similar agreements and/or activities with other public or private entities.
- G. Any party may terminate their participation in this MOU at any time by providing thirty (30) days written notice to all other participating parties.

APPENDIX D

AGENDAS AND MINUTES OF THE CLEAR LAKE TMDL STAKEHOLDER COMMITTEE

Clear Lake TMDL Stakeholder Group
Inaugural Meeting
November 15, 2006

Board of Supervisors Chambers
First Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

9AM – 12PM

Agenda

- Introductions
- Overview of Lake County TMDL's (*Lori Webber*)
- Purpose of Group (*Lori Webber and Bob Lossius*)
- Discussion (*All*)
- Review Action Items
- Set Date and Location for Next Meeting
- Adjourn

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Clear Lake TMDL Stakeholder Group
November 15, 2006
Meeting Notes

Attendees:

Voris Brumfield, Code Compliance Manager, Lake County
Linda Juntunen, West Lake RCD
Gregg Dills, East Lake and West Lake RCD's
Ronda Mottlow, Robinson Rancheria
Sarah Ryan, Big Valley Rancheria
Dietrick McGinnis, McGinnis & Associates LLC
Carolyn Ruttan, DPW Water Resources
Bob Lossius, DPW Lake County
Chuck March, Lake County Farm Bureau
Mary Jane Fagalde, Lake Co CDD Building Official
Pamela Francis, DPW Lake County
Bob Faust, Mendocino N.F.
Stan Schubert, DPW Lake County
Penelope Shibley, Lake County Community Development
Cheri Holden, Sierra Club
Paula Britton, Upper Lake Pomo
Peggie King, Lake County Special Districts
Michael Umbrello, Elem Rancheria
Fred Briones, Big Valley Rancheria

Notes

Lori Webber began the meeting with a short presentation on the Clear Lake nutrient and mercury TMDL's. Both phosphorus and mercury will bind to sediments and therefore enter the lake via erosion from the surrounding watershed. The nutrient and mercury TMDL's require reductions in watershed sources of these constituents. The nutrient TMDL establishes phosphorus load allocations to point and nonpoint sources. The responsible parties are the stormwater permittees and Caltrans (point sources); and USFS, USBLM, Lake County and irrigated agriculture (nonpoint sources). The responsible parties are required to submit a plan to the Regional Board in about one year that describes how they will address additional studies, conditions in the lake, a monitoring program and existing and planned phosphorus control measures. After five years the Regional Board will review the information gathered and determine if the existing control program should continue or be modified. Compliance is required in ten years. The mercury TMDL requires a 20% reduction from existing watershed sources of mercury. The responsible parties for the mercury TMDL are USFS, USBLM and Lake County. The mercury TMDL has been effective since October 2003, and the responsible parties are required to submit a monitoring and reporting plan to the Regional Board in October 2008.

Tom Smythe described an existing project that the County is undertaking to identify mercury "hot spots" in the Clear Lake watershed. This project is funded through Proposition 13 dollars and was initiated as a result of the mercury and nutrient TMDL's. Tom passed out a map of the mercury monitoring sites that are located in streams throughout the watershed. Last month sediment samples were taken at these sites. When the results of these samples come back the Technical Advisory Committee will convene to review and interpret the data. This winter County staff will sample for mercury and nutrients at the stream gages to determine loads of these constituents.

The group then discussed the question of who would be willing to spearhead the effort to develop the required plans and reports. It was noted that some of the participants were named as responsible parties in the TMDL's and others were not responsible parties yet they were interested monitoring and BMP implementation. There was general agreement that everyone was there because they were concerned about water quality in Clear Lake.

Bob Lossius mentioned that the County is already involved in several projects that are related to the TMDL's. The County has developed a GIS database and they have a grant to monitor nutrients and mercury in the watershed. The County will also be working with the East and West Lake RCD's to update the Clear Lake Management Plan. However, the County was concerned that there may be lack of participation from other responsible parties if they accepted the job of coordinating the TMDL reports. Lori Webber said that the Regional Board would write letters to management at each agency reminding them of the TMDL requirements and asking them to participate in the stakeholder group. Lori agreed to write a draft letter and send it to the group for review. Greg Dills mentioned that there was talk of developing a Memorandum of Understanding (MOU) to call for actions to comply with the TMDL's. The MOU would be based on the one that was developed for weed management areas. Greg agreed to send a draft of the MOU to the group for review. Both Bob Faust from the USFS and Chuck March from the Lake County Farm Bureau agreed to share information with the County to help with the development of the reports. The County agreed to coordinate the TMDL reports with the help of the other responsible and interested parties.

Bob Lossius mentioned that the clarity in the lake has improved since 1992 and that phosphorus levels have not dropped. He asked other people that are collecting data to coordinate with the County to figure out what has been going on in the lake since the early 1990s. Tom Smythe pointed out that one of the requirements of the TMDL is to conduct additional studies, which would be an update of the Clean Lakes Report. UC Davis and Lake County DPW wrote the Clean Lakes report in 1992. Tom estimated that it would cost about \$400,000 to update the report. There was a discussion about data that was being generated by the tribes and the need to coordinate it with other groups that are monitoring in Clear Lake. Paula Britton said that it appears that at least two subcommittees need to be formed – a Data Subcommittee and a Grants Subcommittee. The group agreed.

Tom Smythe also pointed out that the group needs to find out what everyone else is doing with regards to monitoring and BMP implementation. It was noted that many of the people at the meeting also attend the Resource Management Committee (RMC) meetings. The next RMC meeting is scheduled for December 8th at 9AM in Lakeport. Members of the group agreed to attend that meeting and provide a brief overview of the work that they are doing. They will also bring a short, written synopsis of their work. Tom Smythe will compile the information and send it out to the group for discussion at the next stakeholder meeting.

Lori Webber asked for volunteers for the Data and Grants Subcommittees. The following people volunteered:

Data Subcommittee

Paula Britton
Dietrick McGinnis
Sarah Ryan
Rhonda Mottlow
Tom Smythe
Pete Juntunen
Stan Schubert

Grants Subcommittee

Paula Britton
Cheri Holden
Tom Smythe

The next meeting of the Stakeholder Group was scheduled for February 7th at 10AM. The Grants Subcommittee meeting was set for January 24th at 10AM and the Data Subcommittee meeting was scheduled for January 24th at 1PM. Tom Smythe agreed to reserve rooms at the County Courthouse for all of the meetings.

Action Items:

1. Lori Webber will draft a letter from the Regional Board to the responsible parties reminding them of the requirements of the TMDL and suggesting that they participate in the Stakeholder Group. She will send a draft of the letter to the group for review
2. Greg Dills will send a draft MOU to the group for review.
3. All interested parties will attend the RMC meeting on December 8th and give an update on their activities. They will also provide a brief written synopsis of their work to Tom Smythe. He will compile them and send them to the group.
4. Data and Grants Subcommittees will meet on January 24th, 2007.
5. The next Stakeholder Group meeting will be on February 7th, 2007 at 10AM. The group will discuss existing work (summarized from the RMC meeting) and possibly have a presentation from Dr. Peter Richerson of UC Davis on nutrients and algae in Clear Lake.

Clear Lake TMDL Stakeholder Group
February 7, 2007

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

Agenda

- Introductions
- Memorandum of Understanding (*see attachment #1*)
- RMC meeting update (*see attachment #2*)
- Data Subcommittee update
- Grants Subcommittee update
- TMDL monitoring project update (*Tom Smythe*)
- Chlorophyll monitoring (*Lori Webber*)
- Other updates or announcements (*any interested party*)
- Next steps
- Adjourn

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Clear Lake TMDL Stakeholder Group
2/7/07 Meeting Notes

Attendees:

Lori Webber, Regional Water Quality Control Board
Stan Schubert, Lake County DPW
Carolyn Ruttan, Lake County DPW
Dwight Holford, Upper Putah Creek Stewardship
Alex Arevalo, Caltrans District 1 NPDES
Bob Lossius, Lake County DPW
Greg Dills, East and West Lake RCD's
Ted Elliot, Lake County Community Development Department
Ron Yoder, Lake County Community Development Department
Jody Larson, Scotts Valley Band of Pomo Indians
Denise Rushing, Lake County District 3 Supervisor
Cheri Holden, Sierra Club
Paula Britton, Habematolel Pomo of Upper Lake
Tom Smythe, Lake County DPW
Bob Faust, Mendocino National Forest
Kim Schwab, Regional Water Quality Control Board
Dietrick McGinnis, McGinnis & Associates, LLC
Sarah Ryan, Big Valley Rancheria

- Memorandum of Understanding (MOU)

A draft MOU was distributed with the agenda. The group discussed some minor revisions. Tom Smythe will make the corrections and send them to the group. Group members will have until March 9th to make comments on the MOU.

- RMC meeting.

A handout was distributed with the agenda that summarized the discussion at the RMC meeting in December. During that meeting each member gave an overview of the work they were doing related to the Clear Lake mercury and nutrient TMDL's. Dietrick McGinnis added that the Elem were also monitoring for nutrients and mercury in the lake. Bob Lossius mentioned that there were many BMP's being implemented as part of the stormwater program.

There was a discussion about the Cache Creek watershed portal, an old website that included a database of studies about the lake. Most of the reports are only available in paper copy. The County had a library of reports in storage. Bob Lossius will see if the Cache Creek watershed portal website is still functioning, and if so, forward the address to the group.

- Data Subcommittee update

The Data Subcommittee met on January 24th and participants discussed their data collection projects in Clear Lake. The group decided that it would be useful to compile information about the monitoring projects, with contact information, in one central location. Members agreed to write a short summary of their data collection project and send it to Lori. She will compile them and send them to the group. We ran out of time before we could discuss data needs and data gaps, so a future meeting was scheduled. The next meeting will be on February 21st at 10AM to 12PM at the Lake County Courthouse. After the meeting, Lori checked with the

Regional Board web master and he said that the data summaries can be posted on the Regional Board website.

- Grants Subcommittee update

The scheduled Grants Subcommittee meeting did not occur because of lack of interest. But during the discussion it was decided that there were enough interested people to attend a future meeting. The focus of the meeting will be to explore ways to apply for funding to update the Clean Lakes report. A possible source of funding is the National Science Foundation. Dietrick McGinnis has experience applying for NSF grants and he will provide the group with information. It was decided that the Grants Subcommittee would meet on February 21st from 12AM to 2PM at the Lake County Courthouse. We only have the room until 2PM so this is going to be a working lunch. Attendees should bring something to eat.

- TMDL monitoring project update

Tom Smythe discussed the results of the mercury hot spot monitoring project. They sampled for mercury in stream sediment at locations throughout the watershed. All of the samples except for one were below the background level set by the Regional Board. The elevated sample was associated with an abandoned mine.

- Chlorophyll monitoring

The Regional Board is working with the Department of Water Resources to conduct chlorophyll monitoring in the lake. DWR staff is taking an extra water sample at each of their three sites on the lake and sending it to the Regional Board lab for analysis. The data from the January 16th sampling run is available. Chlorophyll levels were all below the 73 ug/L target set by the TMDL. Contact Lori Webber if you would like a copy of the data.

Next Meeting:

The next Stakeholder meeting is scheduled for May 16 from 10AM – 12PM. The Data Subcommittee will meet on the same day from 1PM – 3PM.

Clear Lake TMDL Stakeholder Group

February 21, 2007

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

Data Subcommittee Notes

Attendees:

Lori Webber, CVRWQCB
Chuck March, Lake County Farm Bureau
Bob Faust, Mendocino National Forest
Greg Dills, East and West Lake RCD's
Bob Lossius, Lake County Department of Public Works
Pam Francis, Lake County Department of Public Works
Alex Arevalo, Caltrans
Ronda Mottlow, Robinson Rancheria
Stan Schubert, Lake County Department of Public Works

- At the previous Subcommittee meeting participants agreed to write a short description of their data collection efforts and send them to Lori. The USFS and the County responded with data summaries, which were distributed to the group. We are still waiting for the rest of the group to send their reports.
- Pam Francis said that the County has been doing stormwater sampling for nutrients at the gaged streams. Bob Faust said that he would pay for additional samples downstream of Forest Service land if the County would collect them. Pam and Bob will work together to coordinate the sampling. Pam will also contact the BLM to arrange a monitoring site below BLM land in the Scott's Creek watershed.
- Alex mentioned that Caltrans has allocated funding for nutrient studies and roadway characterization in Clear Lake.
- Chuck mentioned that the new monitoring site for the Irrigated Lands program is located on Middle Creek just below the confluence with Clover Creek. Samples were taken about 2 weeks ago. They have identified 13,000 acres of irrigated agriculture in Lake County and have developed a database. They are working on a questionnaire to go out to growers asking about BMP implementation and eventually they will develop a map of BMP's.
- Ronda mentioned that they were taking flow and traditional water quality measurements three times a week at the major tributaries during the hitch season. They are not sampling for nutrients but they will take additional samples if the County provides bottles. Pam will coordinate with Ronda for nutrient sampling.
- There was a discussion on how to interpret and display the data. Pam mentioned that the County has a GIS/database person on staff that will work on making the data SWAMP¹¹ compatible and displaying it using GIS. Pam also said that Tom Smythe will interpret the data that is being collected for the Prop 13 grant, along with the additional data that is collected in collaboration with other groups. The data will be used to start quantifying loads from the responsible parties in the TMDL.
- There was a discussion about data comparability. Each project is operating under a Quality Assurance Project Plan (QAPP), but the QAPP's may be different. Also sampling methods may be different, or

¹¹ Surface Water Ambient Monitoring Program – All grant funded monitoring projects have to submit their data in a SWAMP compatible format.

analytical methods may vary. Lori said that she would look for other programs for ideas on how to interpret data collected from different sources.

- The County and the RCD's are working together on watershed analyses for Scott's, Middle and Kelsey Creek, as well as an update of the Clear Lake Management Plan. Members of the group agreed to share their data to inform this effort.
- Next meeting: The Data Subcommittee will be included as an agenda item for the next Stakeholder Group meeting, which is scheduled for May 16th.

Grants Subcommittee

- Nobody showed up for the grants subcommittee and everyone from the Data Subcommittee had to leave so Grants was cancelled. If there is enough interest a Grants subcommittee meeting can be scheduled in the next couple of months.

Clear Lake TMDL Stakeholder Group
October 10th, 2007

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

Agenda

1. Introductions
2. Agenda review
3. Monitoring update (*Tom Smythe and Pamela Francis*)
4. Memorandum of Understanding (*Tom Smythe*)
5. Monitoring and implementation plan (*all*)
6. 319(h) Request for Proposals (*Lori Webber*)
7. Other updates or announcements (*all*)
8. Next steps
9. Adjourn

Clear Lake TMDL Stakeholder Group
January 9, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

Agenda

1. Introductions
2. Agenda review
3. Monitoring update (*Tom Smythe*)
4. Memorandum of Understanding (*Tom Smythe*)
5. Monitoring and implementation plan (*all*)
6. 319(h) Request for Proposals (*Tom Smythe*)
7. Other updates or announcements (*all*)
8. Next steps
9. Adjourn

Clear Lake TMDL Stakeholder Group
January 9, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

NOTES

Attendees

Tom Smythe, Lake County DPW
Kim Schwab, CVRWQCB
Lori Webber, CVRWQCB
Chuck March, Farm Bureau
Bill Combs, Big Valley Rancheria
Nancy Kampas, Caltrans
Cheri Lee Glen Holden, Sierra Club
Nathalie V. Antus, City of Clearlake
Robin S. W. Mowery, USFS Mendocino NF
David L. Melendrez, Caltrans
Linda Juntunen, West Lake RCD
Frank M. Arriaza, BLM

Monitoring Update

The County has been continuing with their nutrient and mercury monitoring in the Clear Lake watershed. A "hot spot" was discovered near the Utopia Mine. An area about 4"-5" in diameter had Hg levels up to 140 ppm (background is 0.05 ppm). There are some areas nearby in the lake with elevated mercury levels but it is probably legacy contamination. The mercury is probably not being actively transported from the Utopia mine to the lake. The County also conducted mercury monitoring in other areas of the watershed. Elevated levels were found in High Valley (which may be a result of using fill from the Sulphur Bank Mercury Mine), Cole Creek and a tributary to Cole Creek. Additional sampling will be required in these locations. The County also conducted some storm sampling for nutrients and mercury in December and January. The Forest Service collected some samples near Middle Creek campground and the County will work with BLM to conduct additional sampling on their lands.

MOU

The MOU has been finalized and the County will be presenting it to their Board sometime in February. The rest of the responsible parties should seek approval of their boards and send signed copies of the signature page to Tom Smythe.

Monitoring and Implementation Plan

Tom distributed the draft plan prior to the meeting. It contains input for some of the responsible parties. At this point only a portion of the plan has been worked on. There are still many sections that have to be written. We will spend the next meeting working on the strategies to comply with the TMDL's as outlined on pages 17 and 18 of the draft plan. Everyone should look at the plan and return comments to Tom by March 3rd.

319(h) Request for Proposals

The County's proposal for 319(h) funds to update the Clean Lakes Report was denied. The project did not meet the requirements of the program because it is a research project rather than an implementation project. But Geoff Schladow from UCD is interested in pursuing the project and the County will look for another source of funding. There may also be an opportunity for students from UC Santa Barbara to do some work on the project.

Next Meeting

The next meeting is scheduled for April 9th from 10 am – 12 pm at the Lake County Courthouse, Conference Room C.

Clear Lake TMDL Stakeholder Group
May 14, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

Agenda

1. Introductions
2. Agenda review
3. Monitoring update (*Tom Smythe*)
4. Memorandum of Understanding (*Tom Smythe*)
5. Monitoring and implementation plan (*all*)
6. Other updates or announcements (*all*)
7. Next steps
8. Adjourn

Clear Lake TMDL Stakeholder Group
May 14, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

NOTES

Attendees

Tom Smythe, Lake County DPW
Pam Francis, Lake County DPW
Dan Little, CVRWQCB
Chuck March, Farm Bureau
Sarah Ryan, Big Valley Rancheria
Nathalie V. Antus, City of Clearlake
Robin S. W. Mowery, USFS Mendocino NF
Greg Dills, East Lake and West Lake RCD
Frank M. Arriaza, BLM
Andrew Britton, City of Lakeport

Monitoring Update

The County has been continuing with their nutrient and mercury monitoring in the Clear Lake watershed. Follow-up monitoring was conducted in High Valley and in the Cole Creek watershed near Mt. Hannah, where elevated mercury levels were previously detected. Additional samples with elevated mercury levels were collected, however, no pattern to the sediment mercury concentrations was detected. Staff will review the data with Regional Board staff prior to conducting additional monitoring, if any.

Water samples were collected at the stream gages in Middle, Scotts and Kelsey Creeks. Ten flow events were sampled for a total of 46 samples collected. Data has been processed, however, it can not be properly analyzed until the gages are recalibrated and flow data is available from DWR. Recent discussions with DWR staff indicated this data may be available in the next month or so.

Recent accounting has shown that the grant funds have been mostly expended. Some limited sampling may be conducted this next year. The grant agreement expires in Spring 2009.

MOU

The MOU has been finalized and was distributed with the meeting agenda. Agencies/groups that sign the MOU should return a copy of the signature page to the County. The County will prepare a checklist showing who has signed the MOU.

Monitoring and Implementation Plan

Tom distributed the draft plan prior to the meeting. Since the January 2008 meeting, only one comment was received and incorporated. All other changes have been unilaterally developed by County staff.

The changes were reviewed. A majority of the changes start on page 18, which is the implementation plan as required by the TMDL's. These are broken out into major sections.

Nutrient TMDL

Studies to assess the current limnological condition of Clear Lake:

- The stakeholders must work together and build partnerships, as no stakeholder has the ability to accomplish this on their own.
- All stakeholders should look for funding sources that will help implement this study.
- Lakebed Management has budgeted \$50,000 to start this process. These funds would be available as a match for grants.
- The collection of mud cores has been stopped due to the impending retirement of Chuck Vaughn, Hopland Research and Extension Center. Lakebed Management has budgeted \$20,000 for continued laboratory services, however, a suitable laboratory has not been identified at this time.
- The Mendocino National Forest is improving its road inventory in the Clear Lake watershed.

Appropriate monitoring for evaluating the conditions in the lake:

- Other monitoring programs to include in the discussion are:
 - Integrated Aquatic Plant Management Plan. Basic water quality parameters such as DO, temperature, pH and secchi depth are collected prior to application.
 - The monitoring program conducted by the irrigated agriculture watershed group for the Agricultural Waiver includes stream monitoring.
 - The California Department of Food and Agriculture (CDFA) collects basic water quality parameters as part of the hydrilla eradication program.
 - Stakeholders that also conduct monitoring should submit a synopsis of their program to the County for inclusion in the Plan.

Additional input on the Plan is to be submitted to Tom Smythe by Friday, June 13.

Next Meeting

The next meeting was scheduled for 10:00 AM to 12:00 N on July 9 in Conference Room C in the County Courthouse.

Clear Lake TMDL Stakeholder Group
July 9, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

Agenda

1. Introductions
2. Agenda review
3. Monitoring update (*Tom Smythe*)
4. Monitoring and implementation plan (*all*)
5. Other updates or announcements (*all*)
6. Next steps
7. Adjourn

Clear Lake TMDL Stakeholder Group
July 9, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

NOTES

Attendees

Greg Dills, WLRCD & ELRCD
Kim Schwab, CVRWQCB
Dan Little, CVRWQCB
Gen Sparks, CVRWQCB
Tom Smythe, Lake County DPW

Due to the lack of stakeholders, the meeting was canceled. We have scheduled the next meeting for 10:00 AM, Wednesday, August 13, 2008, in Conference Room C.

Clear Lake TMDL Stakeholder Group
August 13, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

Agenda

- 10. Introductions
- 11. Agenda review
- 12. Monitoring update (*Tom Smythe*)
- 13. Monitoring and implementation plan (*all*)
- 14. Other updates or announcements (*all*)
- 15. Next steps
- 16. Adjourn

Clear Lake TMDL Stakeholder Group
August 13, 2008

Conference Room C
Third Floor
Lake County Courthouse
255 North Forbes Street
Lakeport, CA 95453.

10AM – 12PM

NOTES

Attendees

Andrew Britton, City of Lakeport
Nathalie Antus, City of Clearlake
Greg Dills, WLRCD & ELRCD
Pamela Francis, Lake County DPW
Cheri Holden, Lake County Sierra Club
Sarah Ryan, Big Valley Rancheria
Tom Smythe, Lake County DPW

Tom Smythe informed the group that a preliminary report on the mercury hotspot monitoring has been submitted to the Regional Board. Analysis is underway on the water quality monitoring and all flow data for 2007 and 2008 has been received. It was pointed out that the County does not have funds budgeted for continued monitoring. There was discussion of other stakeholders possibly funding some continued water quality monitoring at the gages. Tom will provide a list of analytes to monitor, approximate costs and recommended monitoring frequency to the CLTSC for their consideration in future monitoring programs.

The Monitoring and Implementation Plan (Plan) was reviewed. Several changes were recommended. Tom will incorporate the changes and send the revised Plan to the CLTSC for final review. Tom intends on taking the Plan and MOU to the Lake County Board of Supervisors in mid-September.

There was a discussion about the two cities doing some limited monitoring to determine whether the cities were a significant source of nutrients or sediment. It was pointed out that since the cities approximately three percent of the watershed, their contribution is probably small. Funding is not currently available for a monitoring program, and would have to be budgeted in future years.

Tom pointed out that adoption of the Plan by a stakeholder acknowledges that this is a commitment of staff time and funds of an undetermined amount. First, the stakeholder is agreeing to continue programs that are described within the section Existing Efforts. Second, additional activities identified, such as updating the Clean Lakes Report, water quality monitoring, continued participation in the CLTSC, and other activities will cost an undetermined amount of money. No single responsible party should be responsible for bearing the entire cost of an implementation measure. Cost sharing formulas have not been developed. At this time, it is difficult to determine the final cost to comply with the TMDL, however, some activities, such as updating the Clean Lakes Study are likely to cost \$200,000 to \$500,000. Tom and Pam offered to attend council meetings to explain the details of the TMDL's and the Plan.

APPENDIX E

**IMPLEMENTATION PLAN FOR
RECOMMENDED ACTIONS IN THE
CLEAN LAKES REPORT
AND
SUMMARY OF IMPLEMENTATION ACTIONS**

IMPLEMENTATION PLAN FOR RECOMMENDED ACTIONS IN CLEAN LAKES REPORT

Prepared by Lake County Department of Public Works, Water Resources Division:
July 1994

The Clean Lakes Diagnostic/Feasibility Study for Clear Lake, California (Chapter 10) recommends a number of actions for control of nuisance algal blooms in Clear Lake. The report recommends the use of Best Management Practices (BMP's) which are resource management and land-use practices designed to maintain water quality or prevent or minimize water quality problems. This proposed plan for implementation of such BMP's assumes the availability of adequate resources to the County of Lake. The dates in parentheses indicate the target date for completion of each implementation project.

Action 1 Protect and rehabilitate stream channels by Best Management Practices. Restored streams will reduce soil erosion that contributes to the nutrient loading of Clear Lake and thereby limit nuisance blue-green algae scums.

Implementation:

1.1 Scotts Creek Watershed Project - EPA Non-Point Source Grant: In a cooperative effort with landowners, public agencies and community groups, the project will define BMP's by constructing a variety of demonstration projects for rehabilitation and erosion control on the 100-square mile Scotts Creek watershed. Project includes preparation of guidelines for BMP's in the creek and watershed, and a public information program. (July 1, 1994 through June 30, 1996)

1.2 Construct erosion, stream bank and riparian restoration projects. Initial projects will be located on the largest sediment sources: Middle, Scotts, Kelsey and Adobe Creeks. Applications for grant funding for the Middle Creek Restoration Project will take place in 1994. Watershed inventories will be prepared for smaller creeks to identify additional sources suited to stream restoration projects. (2000)

1.3 Prepare Master Plans of Drainage for residential communities around the lake that will include requirements for on-site stormwater detention and sedimentation basins. Kelseyville community is budgeted for FY94-95, followed by North Lakeport, Upper Lake, Nice, Lucerne, Lower Lake and the unincorporated area around the city of Clearlake in subsequent years. (2002)

1.4 Review and evaluate creek maintenance practices of County and cities for consistency with BMP's. (1995)

Action 2 Protect and rehabilitate wetlands for nutrient filtering capability, especially in the Rodman Slough and Robinson Lake area, and also smaller systems:

Implementation:

2.1 Review the deteriorating levee system in the vicinity of Rodman Slough including the Reclamation District levee. Serious consideration will be given to the option of rehabilitating the old Robinson Lake area as a functioning wetland with sediment retention, nutrient filtering capability, and significant flood control

benefits. Following this review, staff will recommend an appropriate strategy to the Board of Supervisors. (1995)

2.2 Should the rehabilitation of the Robinson Lake area be selected as a viable option for the flood control needs, the requirements of CEQA and NEPA must be considered. Environmental documentation, acquisition of rights-of-way, engineering, design and preparation of plans will take several years to complete. (2003)

2.3 Construct erosion control and flood control improvements in the Robinson Lake area. (2005)

2.4 Develop a public education program to inform private landowners near the lake of the benefits of maintaining and managing small wetland areas on their properties. This could include working with community groups and area high schools to restore tule marshes on the lake shore. (ongoing)

2.5 Review the County's proposed wetland policy for consistency with BMP's and evaluate the report recommendation of 3 for I wetland mitigation policy. Recommend adoption of the policy to the Board of Supervisors. (1996)

Action 3 Reduce erosion from roads:

Implementation:

3.1 Review and discuss road maintenance and construction practices with the various agencies and private owners of roads and driveways in the Clear Lake Basin. In particular, meet with Caltrans, Bureau of Land Management (BLM), and U. S. Forest Service (USFS). (1996)

3.2 Review and evaluate County practices and procedures for road maintenance and construction for consistency with BNDS. Make appropriate recommendations for rehabilitation of unused roads and particularly erosive dirt roads. (1995)

3.3 Prepare guidelines for BMP's to reduce erosion from roads and driveways. Consult with Air Quality Management District. (1996)

Action 4 Control miscellaneous earth moving that increases erosion into the lake:

Implementation:

4.1 Review the County's grading ordinance for consistency with BNDS. Make appropriate recommendations. (1997)

Action 5 Control erosion after wildfire:

Implementation:

5.1 Review and discuss practices and procedures for erosion control after wildfires with BLM, USFS. Make appropriate recommendations where improvement is needed to be consistent with BMP's. (1997)

5.2 Obtain or prepare guidelines for BMP's for use by private property owners in wildfire areas. (1997)

Action 6 Use phosphorous export in negotiations with Yolo County Flood Control and Water Conservation District regarding draw down schedule:

Implementation:

6.1 The current operating procedure for Cache Creek Dam is probably optimal for summertime phosphorous export. Flood Control staff will continue to monitor operations of Cache Creek Dam and Indian Valley Reservoirs. Since annual nutrient status varies with climatic changes, coordination with the water quality monitoring program will indicate if minor revisions to the operating schedule should be pursued. (ongoing)

Action 7 County should require proper circulation in future confined-channel developments.

Implementation:

7.1 Review existing codes and ordinances that control development of lake-side lagoons and inlets for consistency with BMP's. Appropriate revisions and/or enforcement recommendations will be made to the Board of Supervisors. (1996)

7.2 Review potential for installation of circulation facilities in existing confined channels. (2002)

Action 8 Establish a lake management agency or consolidate the primary responsibility for major lake problems in a single existing agency:

Implementation:

8.1 Evaluate re-organization options that would consolidate primary responsibility for the lake in a single County department. Make recommendations to Board of Supervisors. (1997)

8.2 Develop policy recommendations to protect water quality through coordinated activities of County departments with interests in the lake and water resources. (1995)

Action 9 Develop adequate financial resources to manage the lake via grants, state agency in-kind contributions, user fees and special assessment districts:

Implementation:

9.1 Propose partial use of Transient Occupancy Tax (TOT) funding for lake enhancement programs. (1994)

9.2 Apply for additional grant funds for implementation of stream restoration and wetlands enhancement programs and for additional assessment of septic systems, etc. (1994 and ongoing)

9.3 Develop partnerships with private, state and federal agencies for potential joint use and cooperative projects. (ongoing)

9.4 Review and evaluate the use of user fees and special assessments to fund major restoration projects. Make recommendations to the Board of Supervisors. (1996)

Action 10 Develop an expanded monitoring program for the lake and stream.

Implementation:

10.1 Coordinate existing monitoring programs with U. S. Geologic Survey (USGS), BLM, USFS, State Department of Water Resources (DWR), Lake County Mosquito Abatement District, U. C. Davis and other County departments. Share data and consolidate efforts where appropriate. (ongoing)

10.2 Review and evaluate adequacy of existing monitoring program for lake management purposes. Recommend additional parameters, sampling frequency, and more timely reporting as appropriate. (1995)

10.3 Continue stream monitoring program. Evaluate and expand where appropriate. Confirm estimate of sediment flow quantities from various sources. Collaborate with SCS to calibrate sediment models and confirm estimates of potential improvements from BMP's. (ongoing)

10.4 Work with other County departments to evaluate need and establishment of monitoring program for septic systems, wastewater collection and treatment systems, and storm drainage systems. (1995)

Action 11 Support a continued Research and Development Program on the lake:

Implementation:

11.1 Encourage academic and applied research, including pilot studies of iron geochemistry, phosphorous availability and recycling dynamics, and alum treatment. Continue to support university efforts by cost-sharing lab facilities and providing a research vessel. (ongoing)

11.2 Work with the Resource Conservation Districts and Soil Conservation Service (SCS) to update and detail the economic assessment provided in the May 1994 Economic Analysis prepared by SCS. (1995)

11.3 Encourage demonstration projects by private firms and/or other research facilities for weed harvesting and skimming technology. (ongoing)

**ACCOMPLISHMENTS TOWARDS FULLFILLING THE
CLEAN LAKES REPORT IMPLEMENTATION PLAN**

Project: Middle Creek Flood Damage Reduction and Ecosystem Restoration Project – Feasibility Study/Environmental Impact Statement/Environmental Impact Report

Objective: Reconnaissance and feasibility study for restoration of the historic Robinson Lake wetland and floodplain areas by breaching the existing levee system to create inlets that direct flows into the historically flooded area. This project will help reduce nutrient inputs to Clear Lake by reducing sediment through the restoration of the historic Robinson Lake. Three alternative restoration projects have been selected for future study. Up to 1,218 acres of wetland habitat are proposed for restoration, including open water, seasonal wetlands, instream aquatic habitat, shaded aquatic habitat, and perennial wetlands.

Primary Party: US Army Corps of Engineers

Partners: State Reclamation Board, State Water Resources Control Board, Department of Water Resources, Lake County Watershed Protection District

Start Date / Ending Date: April 1999 – October 2003, EIS approved December 2004, EIR approved May 2004

Project: Middle Creek Flood Damage Reduction and Ecosystem Restoration Project – Flood Protection Corridor Project

Objective: Purchase residential properties within the historic Robinson Lake wetland and floodplain areas, remove residents, homes and infrastructure to reduce flood risk. Properties will be protected from future development by flood and conservation easements held by the Wildlife Conservation Board.

Primary Party: Lake County Watershed Protection District

Partners: Department of Water Resources, Wildlife Conservation Board

Start Date / Ending Date: August 2003 – August 2009

Project: Middle Creek Stream Restoration Project

Objective: Creek restoration projects (bank stabilization) as a result of past gravel mining.

Primary Party: Robinson Rancheria

Partners: Upper Lake Rancheria, Middle Creek CRMP, West Lake RCD, Lake County Public Works

Start Date / Ending Date: In progress

Project: Wetlands Planning Partnership

Objective: Update of existing wetlands information into a Geographical Information System. Update the current wetlands policy to include CEQA threshold criteria and a wetlands impact mitigation program. Develop a model site management plan for future efforts.

Primary Party: Lake County Public Works

Partners: Lake County Community Development, Lake County Land Trust, Robinson Rancheria, Big Valley Rancheria, UC Davis, East Lake and West Lake Resource Conservation Districts

Start Date / Ending Date: August 2000 / 2004

Project: Upper Lake Watershed Analysis

Objective: To produce a Federal Watershed Analysis on the Upper Lake Management Area Watershed by characterizing the watershed, defining issues and key questions, describing current and reference conditions, and developing recommendations towards improved land use.

Primary Party: Lake County Public Works

Partners: USDA Forest Service

Start Date / Ending Date: October 1997 / September 1999

Project: Scotts Creek Watershed Project

Objective: The Scotts Creek Watershed Project was proposed and funded as a means of demonstrating that a cooperative erosion control program can help mitigate impacts to Clear Lake.

Conclusion and Summary: The goal of the Scotts Creek Watershed project was to demonstrate that a cooperative erosion control program can help mitigate water quality impacts to Clear Lake. This goal has been met through the completion of each of the project's objectives.

1. *Enhancing public understanding of the causes and solutions for erosion of sediments into Clear Lake:* This objective has been met through numerous public workshops, extensive information outreach, BMP pamphlets, a video on erosion in the Clear Lake Basin, participation of local schools in the nursery project, and several erosion control demonstration projects.

2. *Working with local land owners to develop erosion control demonstration projects:* This objective has been met through the inclusion of affected land owners on the technical advisory committee, the BLM stream-crossing project, the Scotts Creek stream bank rehabilitation projects, the vegetated levees, floodplain farming, and Tule Lake Basin demonstration projects.

3. *Development of a watershed inventory for watershed-scale analysis of erosion in the Scotts Creek Basin:* This objective has been met through the completion of the watershed inventory and erosion modeling program.

4. *Demonstrate a watershed-wide management approach for Scotts Creek leading to integrated management of the Clear Lake Basin:* The objective has been met through the completion of the upper watershed erosion management plan, the carrying-out of demonstration projects throughout the watershed, and the Scotts Creek long term recovery plan.

5. *Monitoring the water quality of Scotts Creek and the effectiveness of erosion control work:* This objective has been met through the completion of the Scotts Creek and Clear Lake water monitoring programs, and by the photo point monitoring and physical monitoring of pre and post project sites.

6. *Production of a final report documenting all aspects of the project:* This objective has been met through the submittal of the final report.

Primary Party: Lake County Public Works

Partners: Lake County Planning Dept., Lake County Career Center, Bureau of Land Management, Natural Resources Conservation Service, West Lake Resource Conservation District, U.C. Davis Hopland Field Station, Clear Lake High School, Fuller Productions, Central Valley Regional Water Quality Control Board, Lake County Board of Supervisors

Start Date / Ending Date: May 1994 / January 1998

Project: Community Entrepreneurial Watershed and Water Quality Program

Objective: This project was directed towards improving the community's ability to use proper ecosystem management. The goal was to enable the community to implement Best Management Practices throughout the Clear Lake Basin to control erosion and the nutrient loading of Clear Lake which in turn may reduce the impacts of algal blooms.

Primary Party: Lake County Dept. of Public Works

Partners: Lake County Career Center, Health and Environment Consultants, UC Davis- Clear Lake Environmental Research Center, Lake County Office of Education, several Lake County School Districts

Start Date / Ending Date: July 1996 / January 1998

Project: Watershed Awareness Program

Objective: The long term goal of the Watershed Awareness Program is to encourage widespread public understanding of solutions to the Clear Lake basin's erosion problems which cause nuisance blue-green algae blooms that significantly compromise water quality, tourism, and economic vitality.

Primary Party: Lake County Public Works

Partners: Office of Education, UC Davis, Yuba Community College, Mendocino Community College, Community Development Services, Oak Hills Middle School, Upper Lake Middle School and Clear Lake High School

Start Date / Ending Date: May 1995 / September 1996

Project: Weed Management Program on Clear Lake

Objective: The purpose of the weed management program is to investigate various methods of operations for managing or controlling aquatic weeds (non-hydrilla) in Clear Lake.

Primary Party: Lake County Public Works

Partners: Greater Lakeport Chamber of Commerce

Start Date / Ending Date: October 1996 / December 1999

Project: Clean Lakes Grant

Objective: Diagnosis of the *Causes and Control of Algal Blooms in Clear Lake* with recommended actions.

Primary Party: Lake County Watershed Protection District

Partners: University of California – Davis, California Department of Water Resources

Start Date / Ending Date: 1990 / 1994

Project: Watershed Coordinator Grant

Objective: Establish biological and habitat assessment citizen monitoring team, provide coordination for the BIA funded Middle Creek Stream Restoration Grant, provide a watershed coordinator to work with grass roots watershed groups, coordinate a countywide cleanup day, increase public awareness of habitat loss by using preservation of local native oak woodlands.

Primary Party: West Lake and East lake RCD

Partners: Lake County Public Works, Robinson Rancheria, NRCS, Lake County Air Quality, Lake County Farm Bureau, BLM, USFS, Middle Creek CRMP, Scotts Creek CRMP Schindler Creek CRMP

Start Date / Ending Date: March 1, 2001/ Present

Project: EQIP Education Grant

Objective: Provide a landowners guide to watershed management in Lake County pamphlet, provide 4 workshops and a watershed tour

Primary Party: West Lake and East Lake Resource Conservation Districts

Partners: Lake County Public Works, Natural Resources Conservation Service, Robinson Rancheria

Start Date / Ending Date: June 12, 2000 / in progress

Project: Clean Water Act Pollution Prevention Program

Objective: Long term water quality monitoring program, establish and/or describe baseline conditions, develop management to improve water quality by pollution prevention.

Primary Party: Big Valley Band of Pomo Indians

Start Date / Ending Date: 1997/ ongoing with annual renewal

Project: Clear Lake Basin Watershed Analysis

Objective: The objective of this project was to assess erosion sources and develop management recommendations. The County Water Resources Division, through this Grant Project, has constructed a geographic information system (GIS) data base for the Clear Lake Basin to assist in identifying land uses and sites associated with high erosion potential. This project involved, as a major component, studying a total of five demonstration sites intended to educate the public and encourage better land management practices. The sites selected represent a cross-section of situations where land-use practices have resulted in accelerated erosion. Other important objectives of the project have included reviewing public and private land management practices and policies for erosion control, expanding outreach through workshops and public information materials, and developing management recommendations and an implementation plan/checklist.

Conclusion / Summary:

Primary Party: Lake County Watershed Protection District

Start Date / Ending Date: Completed in March 1999

Project: Upper Cache Creek Stream Team

Objective: The primary goal with the development of the Upper Cache Creek Stream Team was to educate and involve the stakeholders in the Upper Cache Creek Watershed in the monitoring and evaluation of existing and potential restoration sites in the watershed. A series of bioassessment workshops, along with ongoing field training, was the perfect tool to educate citizens about the contributions they could make toward improving water quality. Stakeholders learned that they *can* contribute and play a major role in the health of their watershed.

Volunteers were trained to capably perform site surveys that included the recording of bioassessment field data and the evaluation of physical habitat quality. Benthic macroinvertebrate samples were taken according to required specifications for the Surface Water Ambient Monitoring Program (SWAMP). Further evaluation of the resulting taxonomic worksheets could provide information related to nutrient issues in the monitored streams.

Conclusion / Summary: Biometrics were developed for nine sites, six rated as poor, one as fair and two as good.

Primary Party: West Lake Resource Conservation District

Partners: Placer County Resource Conservation District

Start Date / Ending Date: ? / June 2007

Project: Aggregate Resource Management Plan

Objective: The Aggregate Resource Management Plan (ARMP) was developed as an element of the Lake County General Plan. It serves as a management tool for government and industry and as a program environmental impact report identifying and providing mitigation for adverse environmental impacts associated with the aggregate mining industry.

Conclusion / Summary: Development of the ARMP and its predecessor (Creek Management Plan, 1981) and associated policies and mitigation measures reduced the impacts of in-stream gravel mining in the County, including reduced erosion and biological impacts. In-stream gravel mining ceased to be the major source of aggregate in Lake County, leading to the development of terrace and quarry mining operations.

Primary Party: Lake County Community Development Department

Start Date / Ending Date: Adopted November 19, 1992

Project: Grading Ordinance

Objective: The Grading Ordinance was enacted for the purpose of regulating grading on public and private lands within the unincorporated areas of Lake County. It sets forth rules and regulations to control activities involving excavation, grading and earthwork construction, including fills and embankments; establishes the administrative procedure for the issuance of permits; provides for approval of plans and inspection of grading construction and provides for enforcement and penalties for violation in order to:

- (A) Minimize hazards to life and property;
- (B) Maintain slope stability, protect against soil erosion and the degradation of Clear Lake, watercourses and other water bodies from nutrients, sediments or other deleterious materials;
- (C) Protect the safety, use and stability of public rights-of-way and drainage courses;
- (D) Protect drainage courses and watercourses from obstruction, and protect life and property from the deleterious effects of flooding;
- (E) Protect fish, wildlife and their habitats and promote the retention and restoration of riparian vegetation;
- (F) Ensure that the intended use of a graded site is consistent with the Lake County General Plan and any applicable area plan.
- (G) Protect against the destruction of cultural resources and human burials.

Conclusion / Summary: The current Grading Ordinance (adopted June 2007) and its predecessors (since 1981) have reduced erosion from grading projects in Lake County.

Primary Party: Lake County Community Development Department

Start Date / Ending Date: Since 1981

Project: Watershed Groups

Objective: Formed under the Coordinated Resource Management and Planning (CRMP) process, eight watershed groups have been established in the Clear Lake basin (Upper Cache Creek Watershed - UCCW). Seven of these groups are currently active, and are pursuing many different projects within the boundaries of the watershed. Projects include watershed assessment, annual creek clean-ups, stream restoration projects, invasive weed eradication, firebreak construction, fisheries management, stopping illegal dumping, and participation in community events to help educate the public about contributions they can make to improve the watershed.

Conclusion / Summary: The establishment of watershed groups has helped improve watershed health and public awareness of watershed issues.

Primary Party: East Lake and Westlake Resource Conservation Districts

Partners: Lake County Watershed Protection District, Natural Resources Conservation District, Lake County, Bureau of Land Management, U.S. Forest Service, Department of Fish and Game, Central Valley Regional Water Quality Control Board, Robinson Rancheria, Habematolel Pomo of Upper Lake, Big Valley Rancheria

Start Date / Ending Date: Ongoing

Project: Upper Cache Creek Watershed Planning and Capacity Building Project

Objective: The purpose of this project is to initiate, update and/or complete three watershed assessments, a management plan, and increase stewardship capacity in the Upper Cache Creek watershed. It will provide tools to the stakeholders to implement the mercury and nutrient TMDL's for Clear Lake. The project will produce watershed assessments for Kelsey Creek, Scotts Creek and Middle Creek. He project will update and complete the Clear Lake Basin Management Plan, an integrated watershed management plan for the Clear Lake watershed.

Conclusion / Summary:

Primary Party: West Lake Resource Conservation District

Partners: Lake County Watershed Protection District

Start Date / Ending Date: 2007 / 2009

Project: Geysers Pipeline Project

Objective: The Geysers Pipeline Project is a wastewater treatment and geothermal injection project, which pumps treated wastewater effluent from the Southeast Treatment Plant and Middletown Treatment Plant to the Geysers steam field where it is deep injected for recharge of the geothermal steam field.

Conclusion / Summary: The project has stopped overflows of treated wastewater from the Southeast Treatment Plant to Clear Lake and has helped rejuvenate the geothermal steam fields and electric power generating capacity in the Geysers Geothermal Area.

Primary Party: Lake County Sanitation District

Partners: California Water Resources Control Board, Northern California Power Agency, Calpine Corporation, Pacific Gas and Electric Company, California Energy Commission, U.S. Dept. of Energy, U.S. Dept. of Commerce, U.S. Dept. of the Interior and the U. S. EPA.

Start Date / Ending Date: 1997 / present

Project: Clear Lake Basin 2000

Objective: Clear Lake Basin 2000 is a wastewater treatment and geothermal injection project, which pumps treated wastewater effluent from the Northwest Treatment Plant and Clearlake Oaks County Water District

Treatment Plant to the Southeast Treatment Plant where the combine effluent is pumped to the Geysers steam field where it is deep injected for recharge of the geothermal steam field. The project builds on the success of the Geysers Pipeline Project.

Conclusion / Summary: The project has stopped overflows of treated wastewater from the Northwest Treatment Plant and the Clearlake Oaks Treatment Plant to Clear Lake and has helped rejuvenate the geothermal steam fields and electric power generating capacity in the Geysers Geothermal Area.

Primary Party: Lake County Sanitation District

Partners: Clearlake Oaks Water District, California Water Resources Control Board, Northern California Power Agency, Calpine Corporation, Pacific Gas and Electric Company, California Energy Commission, U.S. Dept. of Energy, U.S. Dept. of Commerce, U.S. Dept. of the Interior and the U. S. EPA.

Start Date / Ending Date: 1999 / present

Project: Full Circle

Objective: Full Circle is a wastewater treatment and geothermal injection project, which pumps treated wastewater effluent from the City of Lakeport Treatment Plant and Kelseyville Treatment Plant to the Geysers steam field where it is deep injected for recharge of the geothermal steam field. The project builds on the success of the Geysers Pipeline Project and the Clear Lake Basin 2000 project.

Conclusion / Summary: The project will stop overflows of treated wastewater from the City of Lakeport Treatment Plant and the Kelseyville Treatment Plant to Clear Lake and will help rejuvenate the geothermal steam fields and electric power generating capacity in the Geysers Geothermal Area.

Primary Party: Lake County Sanitation District

Partners: City of Lakeport, California Water Resources Control Board, Northern California Power Agency, Calpine Corporation, Pacific Gas and Electric Company, California Energy Commission, U.S. Dept. of Energy, U.S. Dept. of Commerce, U.S. Dept. of the Interior and the U. S. EPA.

Start Date / Ending Date: 2003 / ?

Project: Proposition 13 Invasive Weeds

Objective: To inventory, eradicate, monitor eradication efforts and educate the public on two invasive riparian species of concern, *Arundo donax* and *Tamarix spp.* in the Upper Cache Creek and Upper Putah Creek watersheds. The anticipated outcome was restoration of riparian habitat through arundo and tamarisk eradication and increased public awareness about invasive species and the importance of riparian function.

Conclusion / Summary: The objective was partly achieved with arundo. Arundo was by far the more important invasive species in the County, so it was chosen to be surveyed, eradicated by biomass removal and herbicide application, and monitored to assess the effectiveness of treatment. Tamarisk was surveyed so that future funding could be used for its eradication. Arundo has not been completely eradicated, future funding will achieve this goal.

Primary Party: Lake County Watershed Protection District

Partners: West Lake Resource Conservation District, Lake County Agriculture Department

Start Date / End Date: June 30, 2004 / March 31, 2007

Project: Team Arundo del Norte

Objective: To inventory, eradicate, monitor eradication efforts and educate the public on the invasive riparian species, *Arundo donax* in the Upper Cache Creek watershed. The anticipated outcome was restoration of riparian habitat through arundo eradication and increased public awareness about invasive species and the importance of riparian function.

Conclusion / Summary: The eradication efforts on Arundo, begun with Prop 13 funding, were augmented and continued by the TAdN grant. Eradication protocol has improved as far as timing of herbicide application and importance of monitoring. This funding will make another big dent in the arundo population but will not achieve total eradication.

Primary Party: Lake County Watershed Protection District

Partners: West Lake Resource Conservation District, Lake County Agriculture Department

Start Date / End Date: March 15, 2005 / March 15, 2009

Project: Tamarisk Strike Team

Objective: To inventory, eradicate, monitor eradication efforts and educate the public on the invasive riparian species, *Tamarix spp.* in Lake County. The anticipated outcome will be restoration of riparian habitat through tamarisk eradication and increased public awareness about invasive species and the importance of riparian function.

Conclusion / Summary:

Primary Party: West Lake Resource Conservation District

Partners: Lake County Watershed Protection District, Lake County Agriculture Department

Start Date / End Date: Jan 1, 2008 / Jan 1, 2010

Project: Water Primrose Eradication

Objective: To inventory, eradicate, monitor eradication efforts and educate the public on the invasive aquatic species, creeping water primrose, *Ludwigia peploides ssp.* in Clear Lake. The anticipated outcome will be restoration of aquatic and riparian habitat through water primrose eradication and increased public awareness about invasive species and the mechanism of transportation and spread in the aquatic environment.

Conclusion / Summary:

Primary Party: West Lake Resource Conservation District

Partners: Lake County Watershed Protection District, Lake County Agriculture Department

Funding Amount: \$8,066.00

Start Date / End Date: Jan 1, 2008 / Jan 1, 2010

Project: Clear Lake Integrated Aquatic Plant Management Plan

Objective: To provide guidance for the environmentally sound management of aquatic plants in Clear Lake. To regulate all weed control in Clear Lake by a single point permitting process.

Conclusion / Summary: The permitting process provides a user friendly way of killing weeds along the shoreline of Clear Lake while collecting NPDES reporting information. In this way, pesticide use in Clear Lake can be monitored such that Clear Lake complies with today's water quality regulations.

Primary Party: Department of Public Works, Water Resources Division

Partners: California Department of Food and Agriculture, Lake County Agriculture Department

Start Date / End Date: August 1, 2004 - present